

Poverty and obesity

Adam Drewnowski, PhD

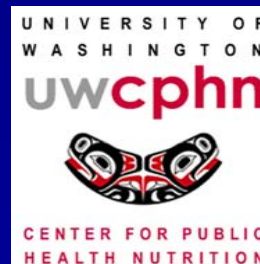
Director, Center for Public Health Nutrition

Director, Nutritional Sciences Program

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School of Public Health and Community Medicine

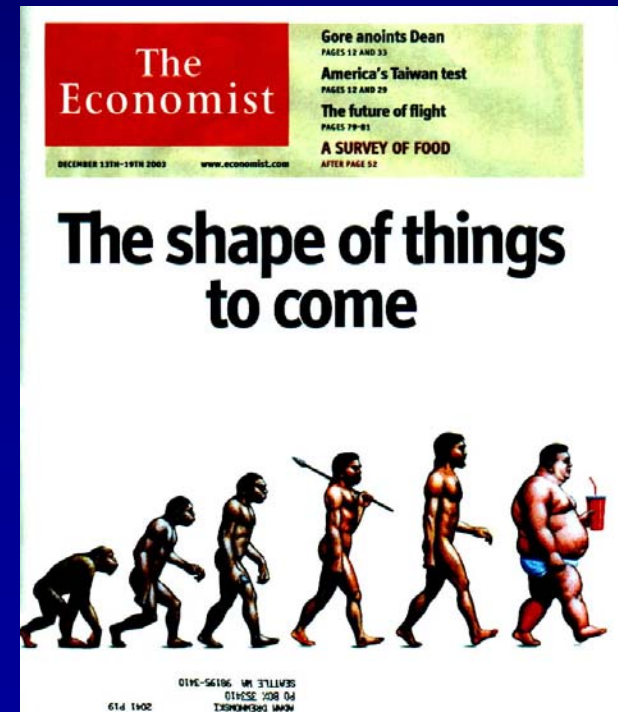
University of Washington



Obesity and the Built Environment: Improving Public Health through Community Design, Washington DC, May 24-26, 2004

The obesity epidemic: some basic points

- Obesity in the US is a social and an *economic* problem
- Highest rates of obesity and type 2 diabetes are found among minorities and the working poor
- The lowest-cost diets are composed of starches, added sugars, and added fats
- “Healthier” diets cost more
- Access to healthy foods and to PA depends on economic resources and the built environment



There are many links between social disparities and health outcomes:

The low cost of energy- dense foods may be one such link

Special Article

Poverty and obesity: the role of energy density and energy costs^{1,2}

Adam Drewnowski and SE Specter

ABSTRACT

Many health disparities in the United States are linked to inequalities in education and income. This review focuses on the relation between obesity and diet quality, dietary energy density, and energy costs. Evidence is provided to support the following points. First, the highest rates of obesity occur among population groups with the highest poverty rates and the least education. Second, there is an inverse relation between energy density (MJ/kg) and energy cost (\$/MJ), such that energy-dense foods composed of refined grains, added sugars, or fats may represent the lowest-cost option to the consumer. Third, the high energy density and palatability of sweets and fats are associated with higher energy intakes, at least in clinical and laboratory studies. Fourth, poverty and food insecurity are associated with lower food expenditures, low fruit and vegetable consumption, and lower-quality diets. A reduction in diet costs in linear programming models leads to high-fat, energy-dense diets that are similar in composition to those consumed by low-income groups. Such diets are more affordable than are prudent diets based on lean meats, fish, fresh vegetables, and fruit. The association between poverty and obesity may be mediated, in part, by the low cost of energy-dense foods and may be reinforced by the high palatability of sugar and fat. This economic

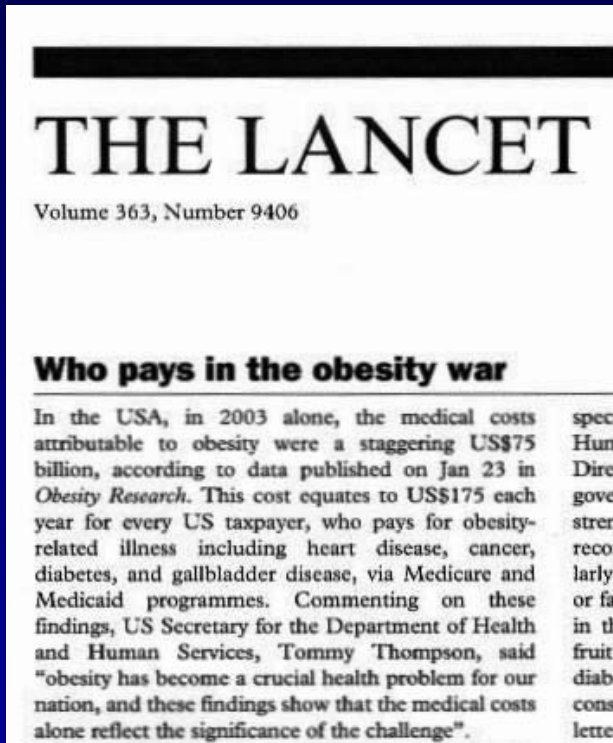
Public health policies for the prevention of obesity increasingly call for taxes and levies on fats and sweets, both to discourage their consumption and to help promote alternative and healthier food choices (15, 16). Past studies on dietary antecedents of obesity have addressed taste preferences for sugar and fat as well as preferences for energy-dense foods (17–19). In contrast, the relation between fat and sugar consumption, dietary energy density (MJ/kg), and energy costs (\$/MJ) has not been explored. Establishing associative links between obesity, dietary energy density, and energy costs is the chief focus of this report

POVERTY AND OBESITY

Obesity rates in the United States have risen sharply over the past 2 decades (20–22). By 1999–2000, 64% of adults aged ≥ 20 y were classified as overweight and 30% were classified as obese. Overweight is defined as a body mass index (BMI; in kg/m^2) > 25 , whereas obesity is defined as a BMI > 30 (20). A sharp increase in the number of massively obese people (BMI > 35) has been observed in certain population subgroups (23).

There is no question that the rates of obesity and type 2

A new focus on food costs



- High-fat **energy-dense** foods are often the **cheapest** options for the consumer
- As long as a meal of grilled chicken, broccoli and fresh fruit **costs more**, and is less **convenient** than a burger and fries – then the battle against obesity will be lost

Editorial, The Lancet January 31, 2004

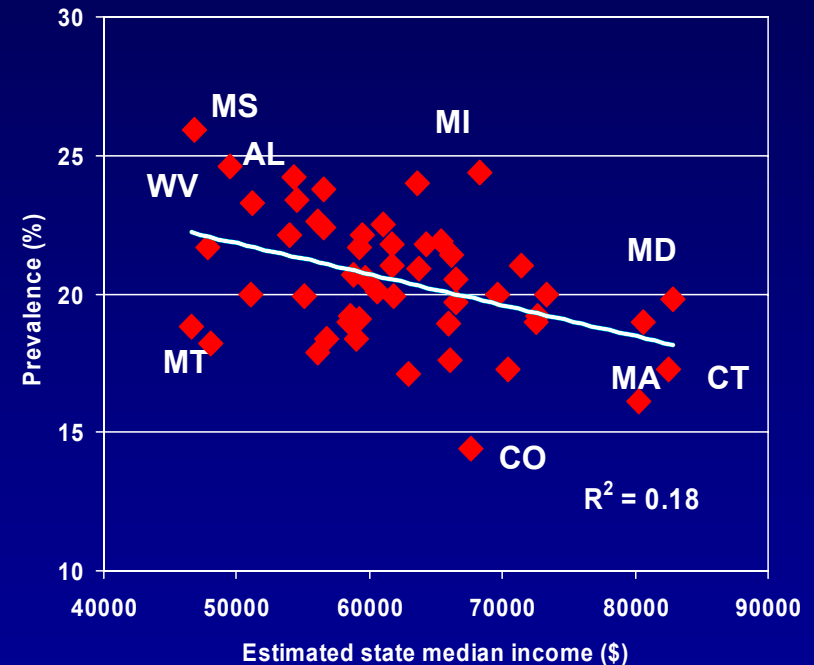
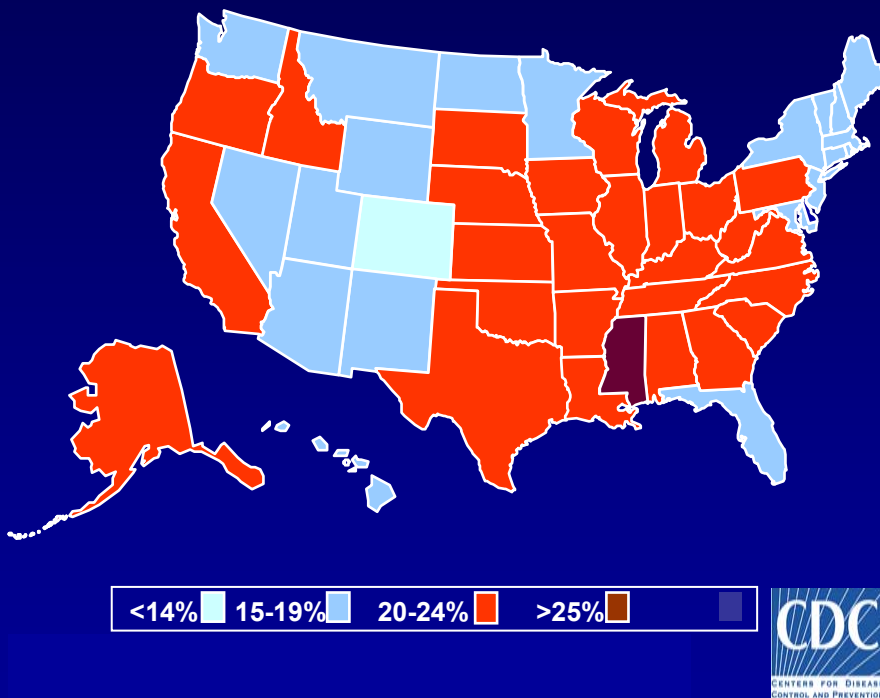
Abundant choices of relatively **inexpensive**, **calorically-dense** foods that are **convenient**, and **taste** good

Draft NIH Plan for Obesity Research 2004

The first question:

Is obesity a socioeconomic issue?

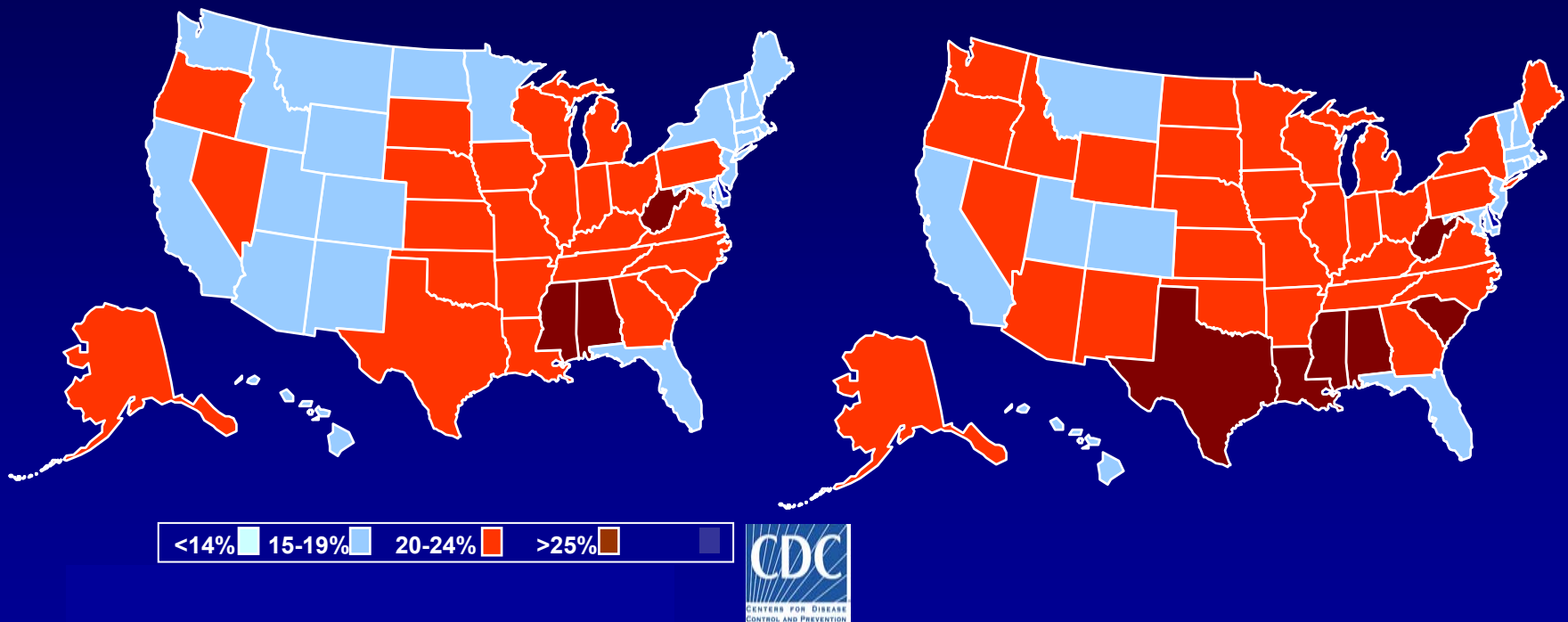
In 2001, MS had the highest obesity rates



Obesity trends: BRFSS (2001) data from the CDC ($\text{BMI} \geq 30$)
Estimated state median incomes for 4 person families (2001): Bureau of the Census
Analyses: Drewnowski 2003

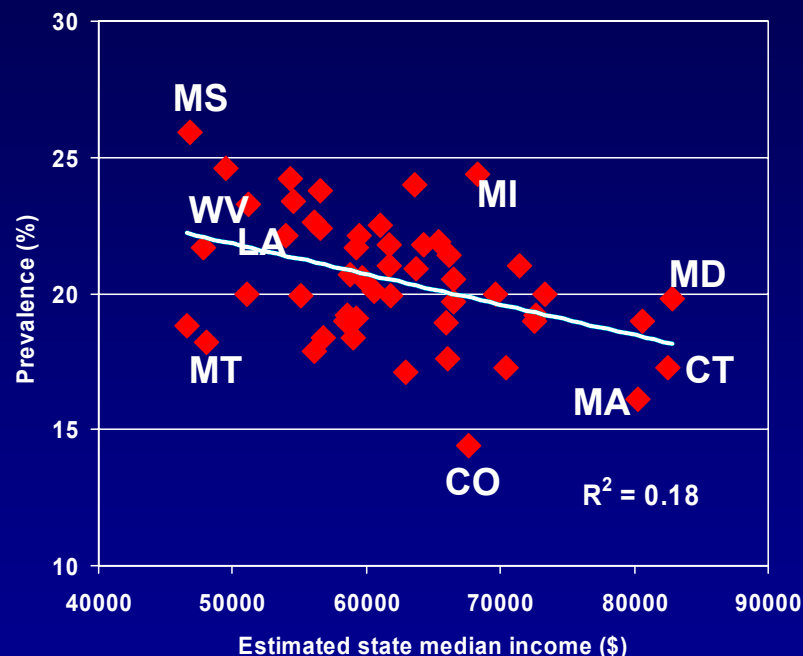
**By 2002, it was followed
by AL and WV**

**and then by TX, LA,
and SC**



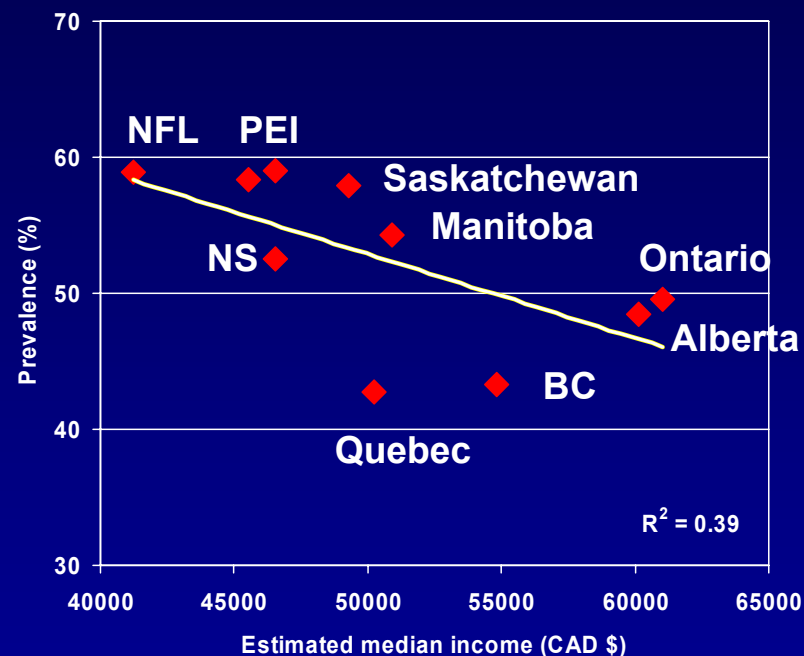
Obesity trends: BRFSS (2002) data from the CDC (BMI ≥ 30)
Right panel: NY Times 01/04/04

US 2001: Obesity and incomes by state



US data: BRFSS (2001) data from the CDC; Estimated state median incomes for 4 person families (2001/2004): Bureau of the Census

Canada 2000: Overweight and incomes by province



Canada data: Statistics Canada, Nat'l Population Health Survey 1998 (BMI>25)
Census families median incomes, Canada, Provinces and Territories 2000

Analyses: Drewnowski 2003

**But obesity is driven not only by
low incomes**

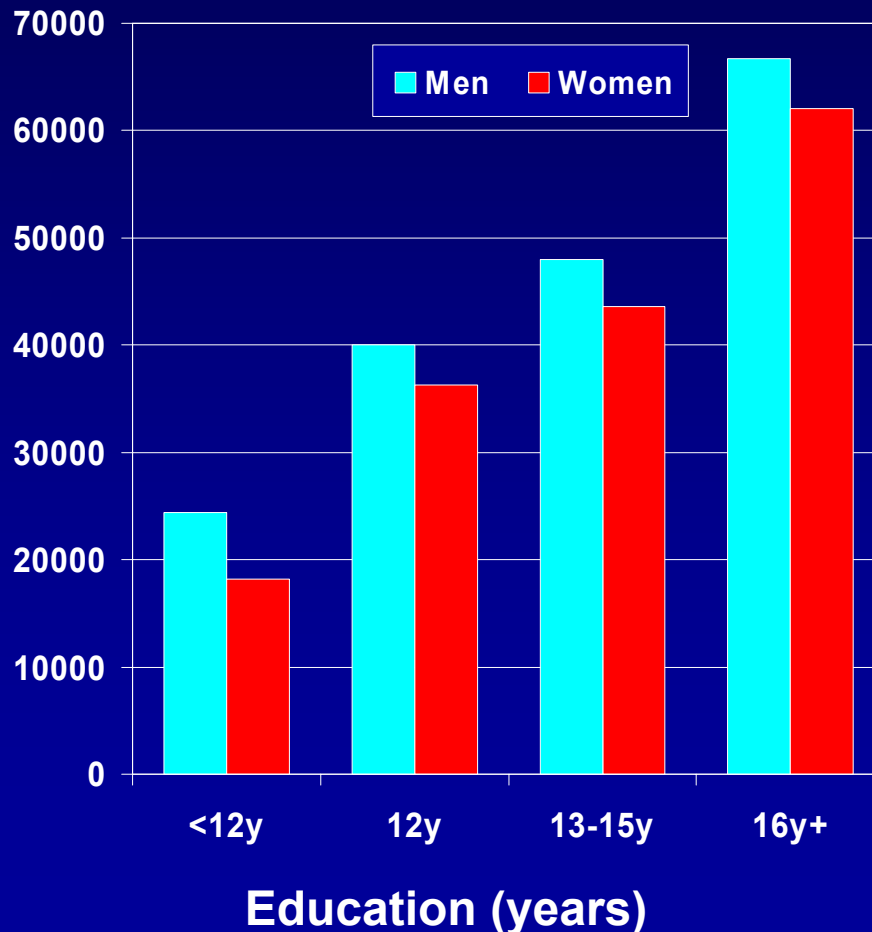
Many measures of SES exist

- **These variables measure socioeconomic position – i.e. the place of individual in society**
 - Education, occupation
 - Income and consumption (flow variables)
 - Assets and wealth (stock variables)
 - Social capital (networks)
 - Social context (neighborhoods and the built environment)
- **Access to resources is vital to maintaining and protecting health – this includes physical access**

Measures of SES are not always linked

- Collecting and analyzing income, wealth, *and* consumption data is difficult and expensive
- Income \neq consumption \neq expenditures
- Economists create consumption aggregates
 - Food consumption (purchased + away-from-home)
 - Non-food consumption (clothing, health)
 - Durables and housing
- Adjust for household size and cost of living
- There are also area-based measures of SES

Most researchers prefer to use education and income to measure SES



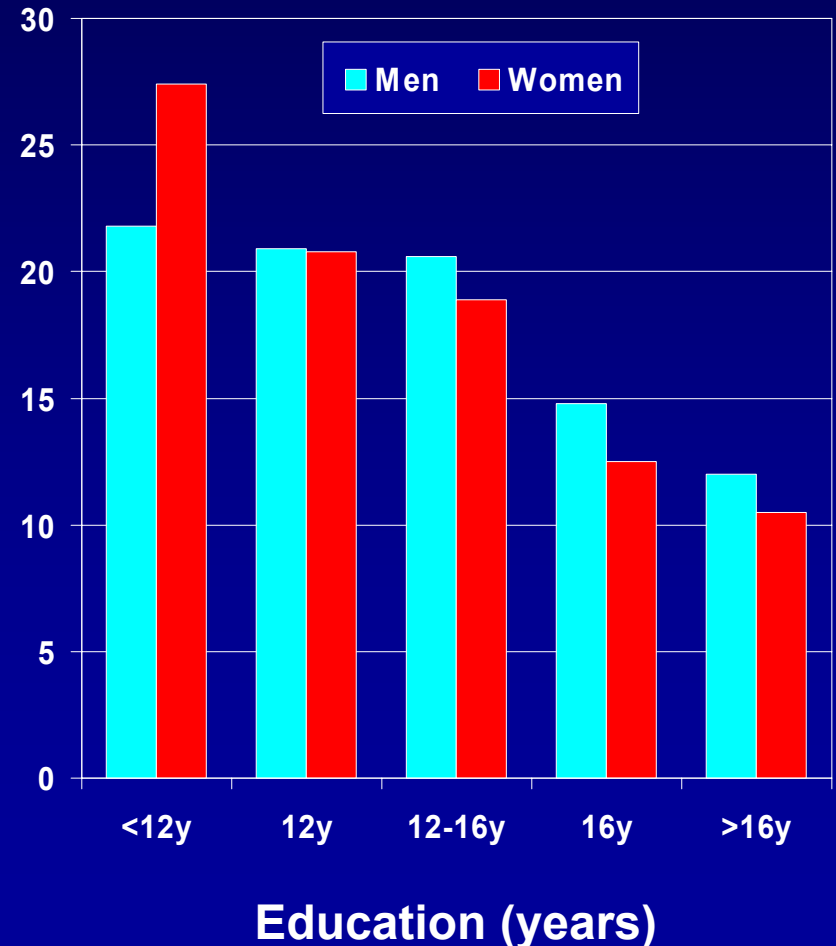
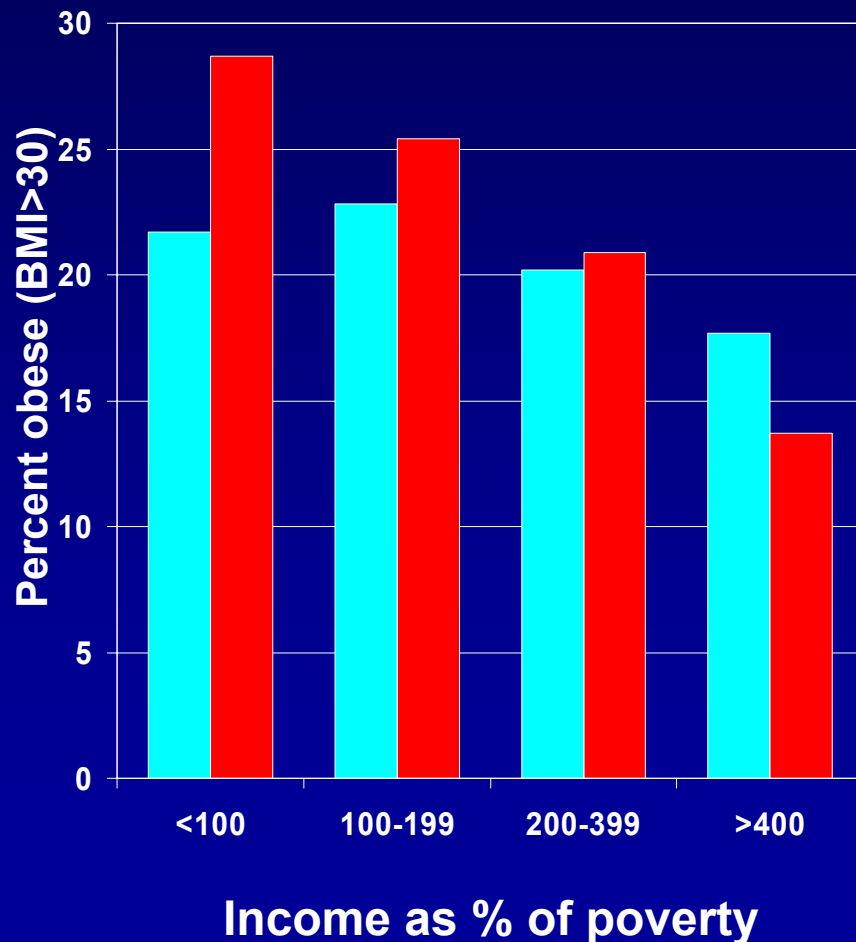
Education and income are the two key indices of socioeconomic status (SES)

Source: US Department of Commerce, Bureau of the Census Current Population Survey, March 1997.

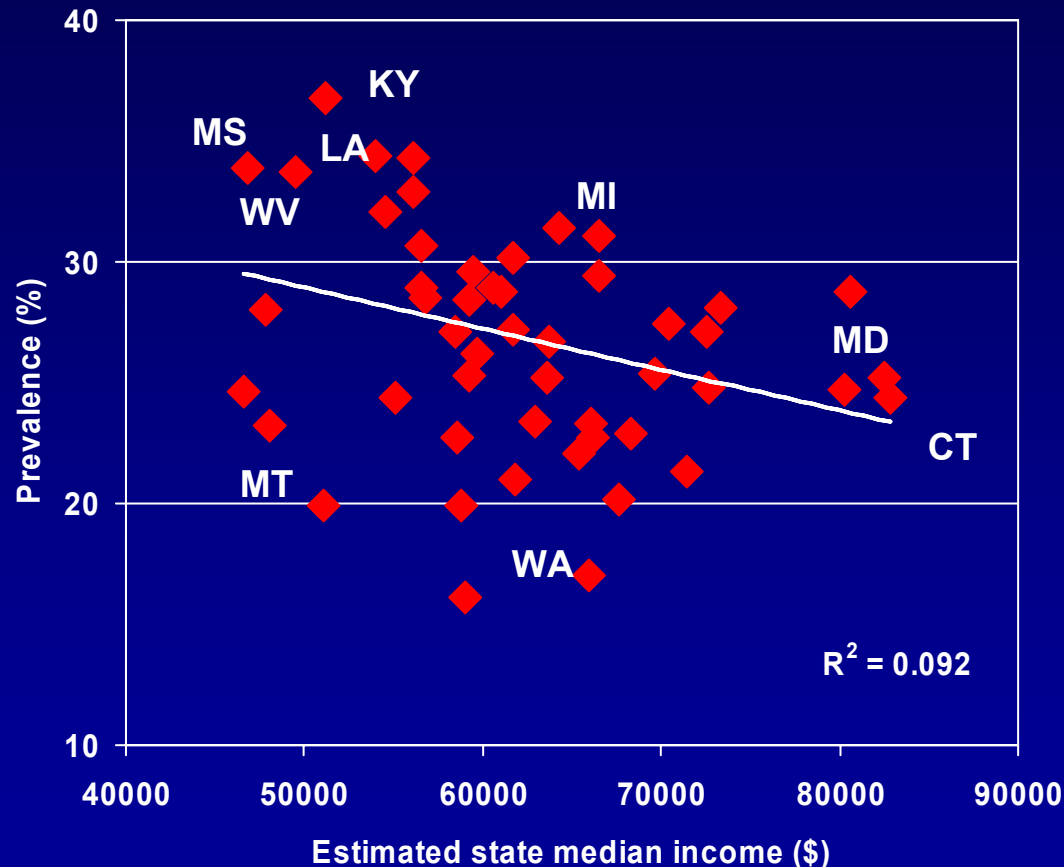
Healthy People 2010 (p.13)

Social disparities: Low education and income = more obesity

(CDC/NHCS data 2002 cited in Drewnowski & Specter, 2004)



More inactivity in lower-income states: 2001



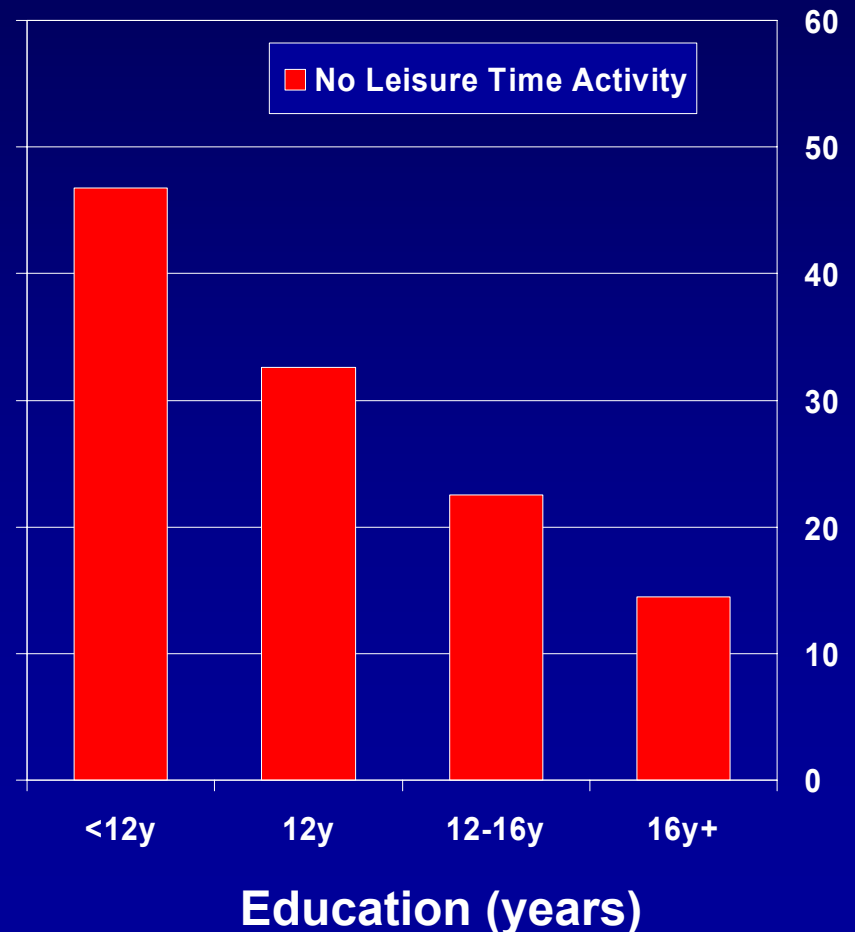
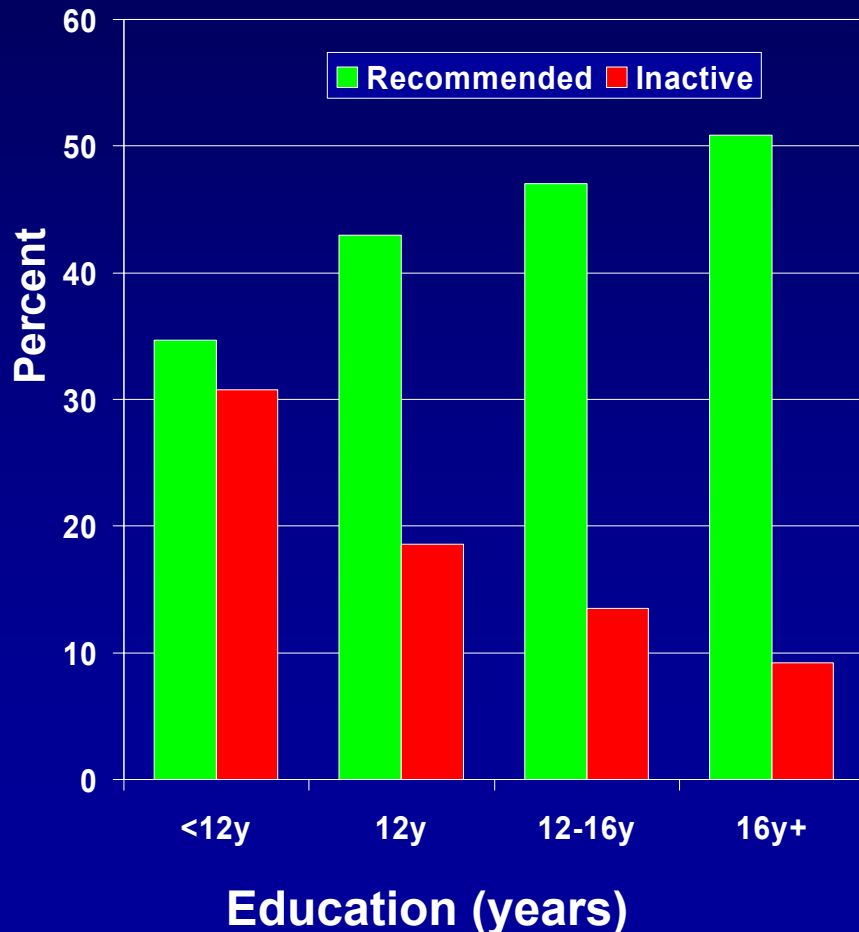
- In general, states with low mean household incomes are more inactive
- Poverty offers few options for “leisure-time physical activity”

Inactivity rates: BRFSS (2001) data from the CDC

Estimated state median incomes for 4 person families (2001): Bureau of the Census

Lower education = less physical activity

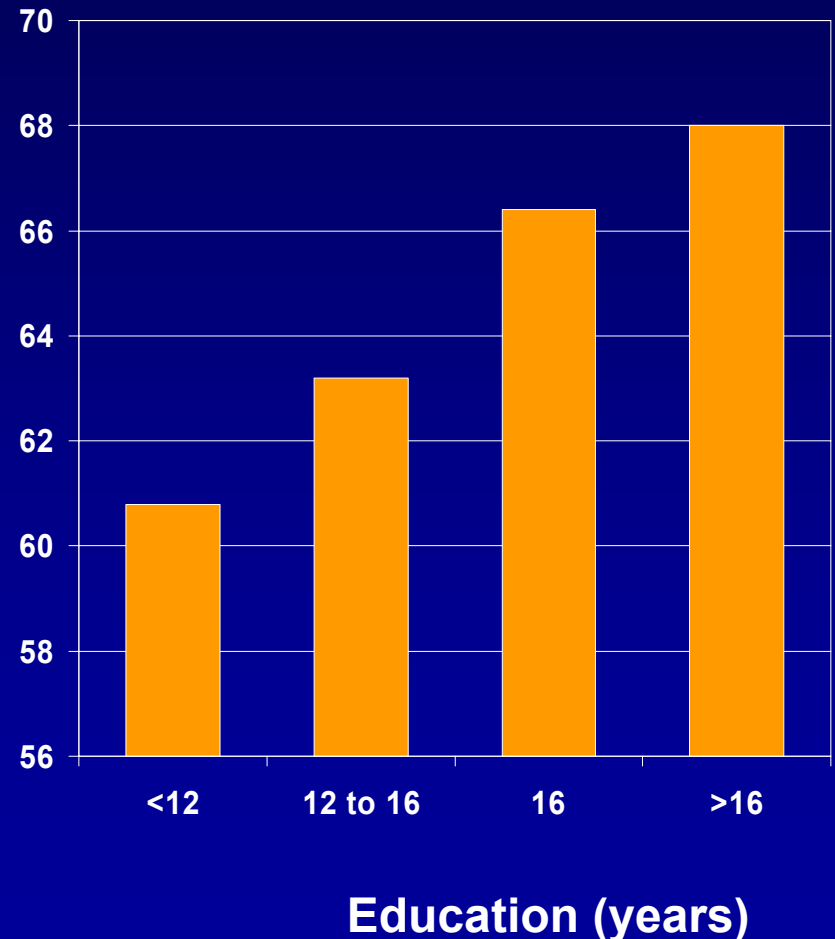
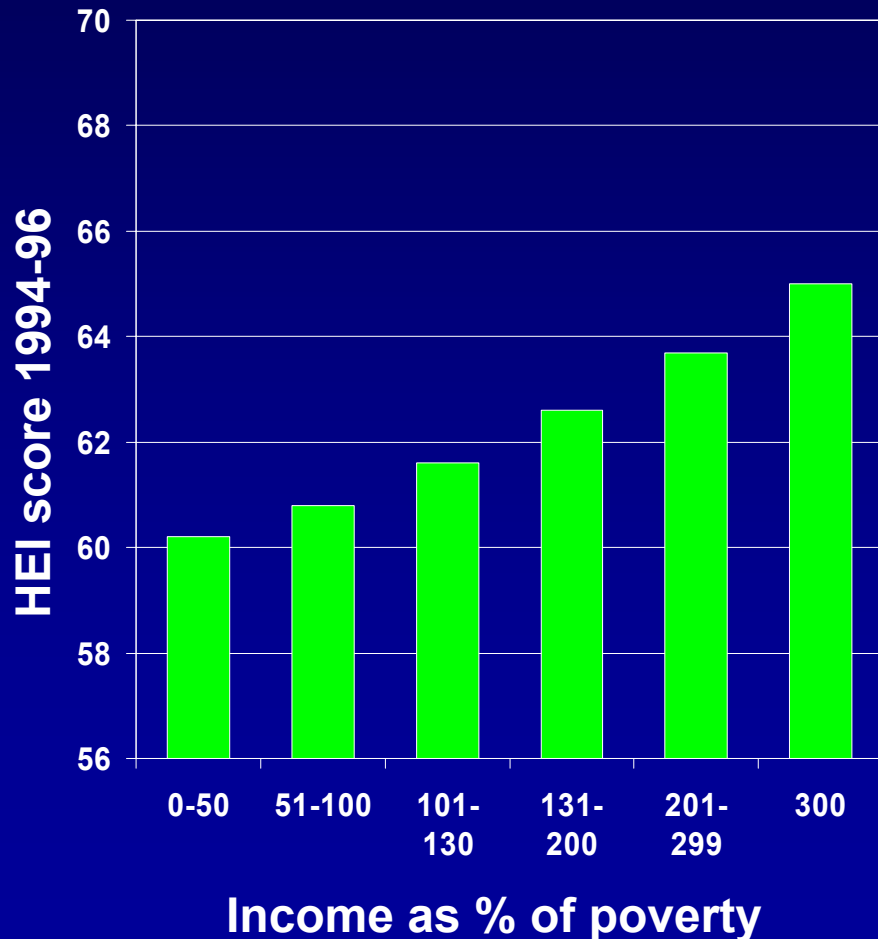
(CDC/NHCS data 2001)



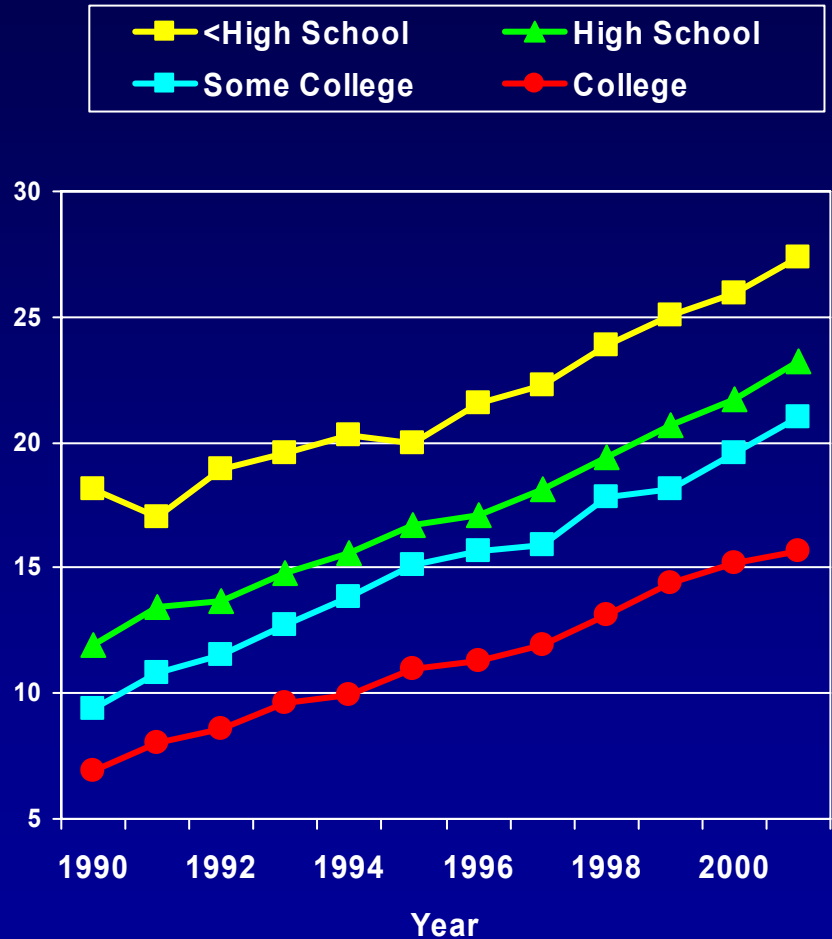
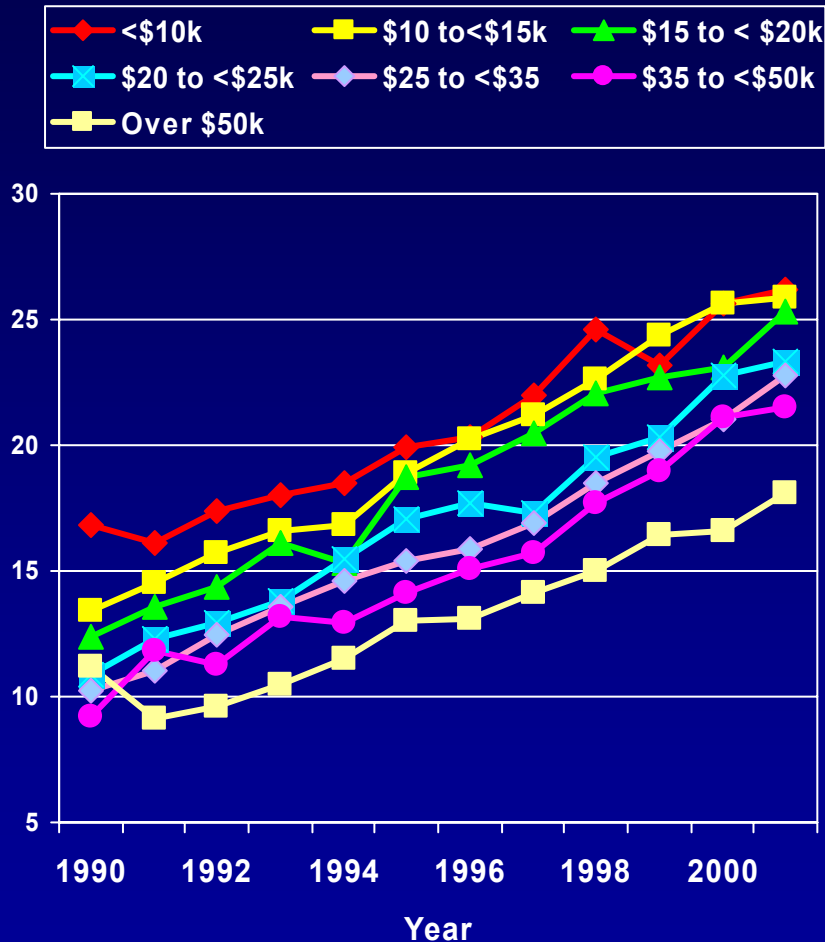
Higher education and income = better diets

(USDA/CNPP data cited in Drewnowski & Specter, 2004)

Healthy Eating Index (HEI) is a measure of diet quality



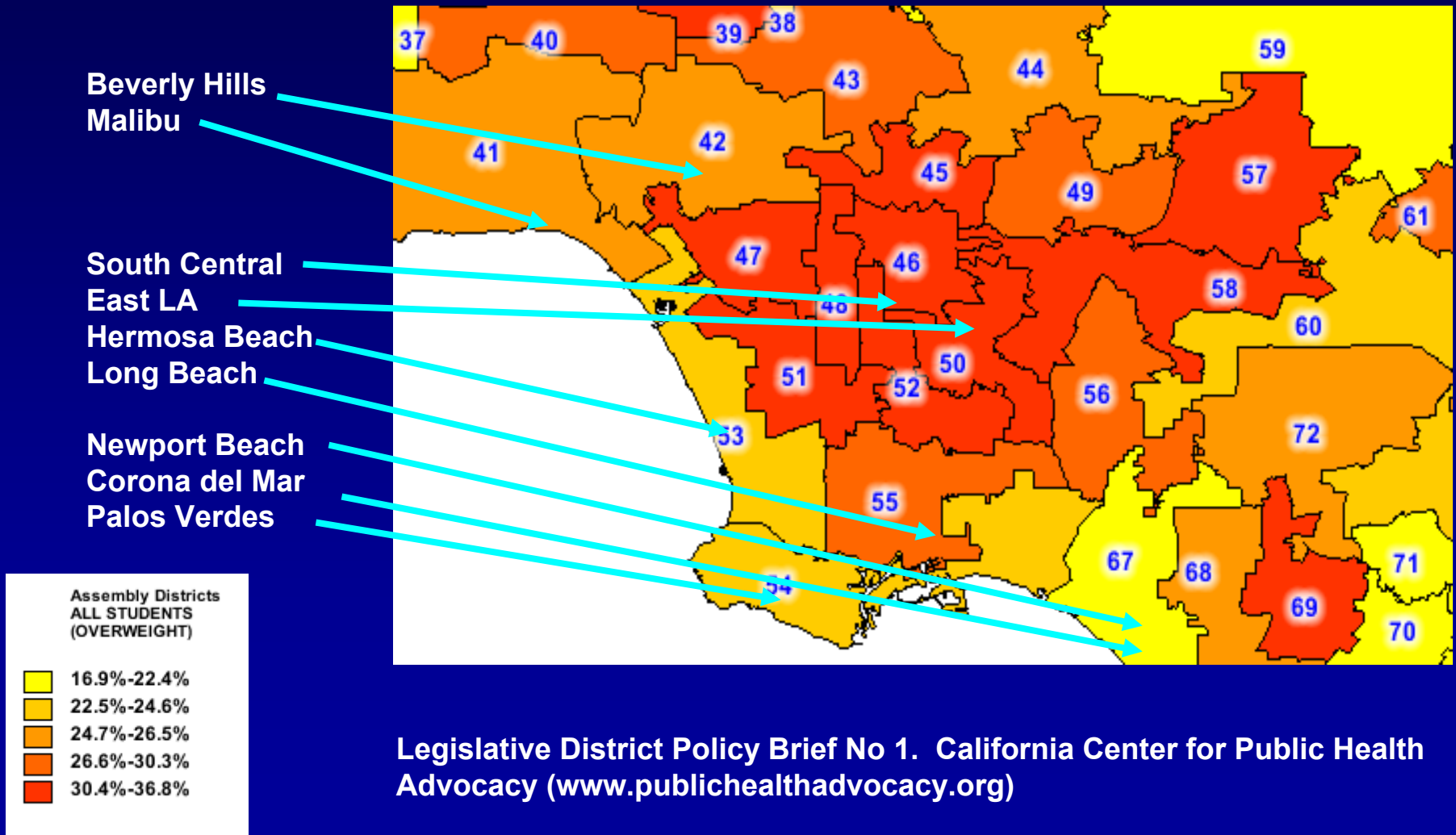
A puzzle: All groups are becoming more obese



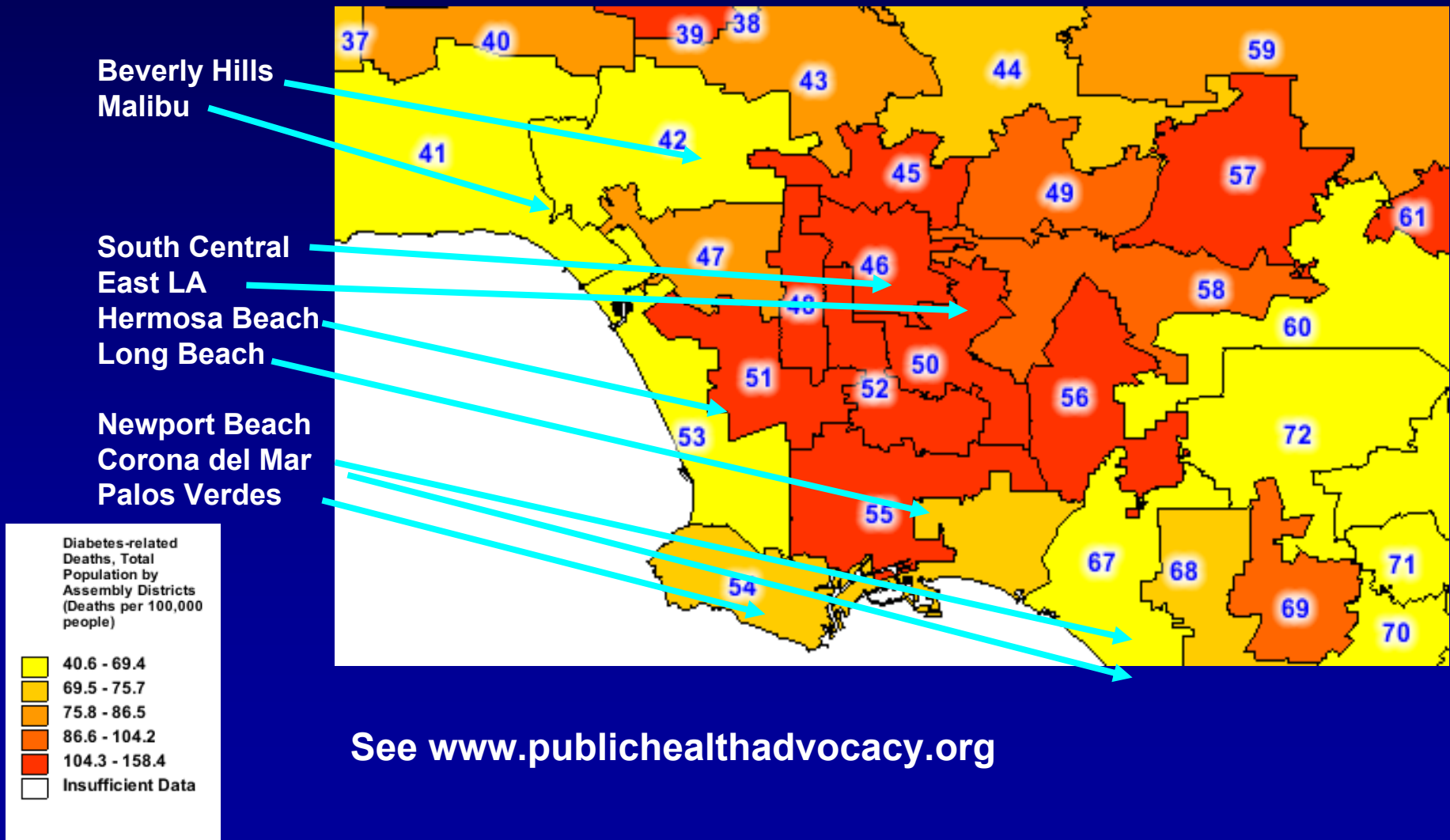
Obesity (BMI>30) trends by income and education groups based on BRFSS 1990-2001 data: analyses by Roland Sturm, RAND Corporation, 2003

**What about obesity rates by
geographic area?**

California FITNESSGRAM: More unfit and overweight kids in lower-income areas



And not just kids: Diabetes-related deaths (per 100,000) by California Assembly District

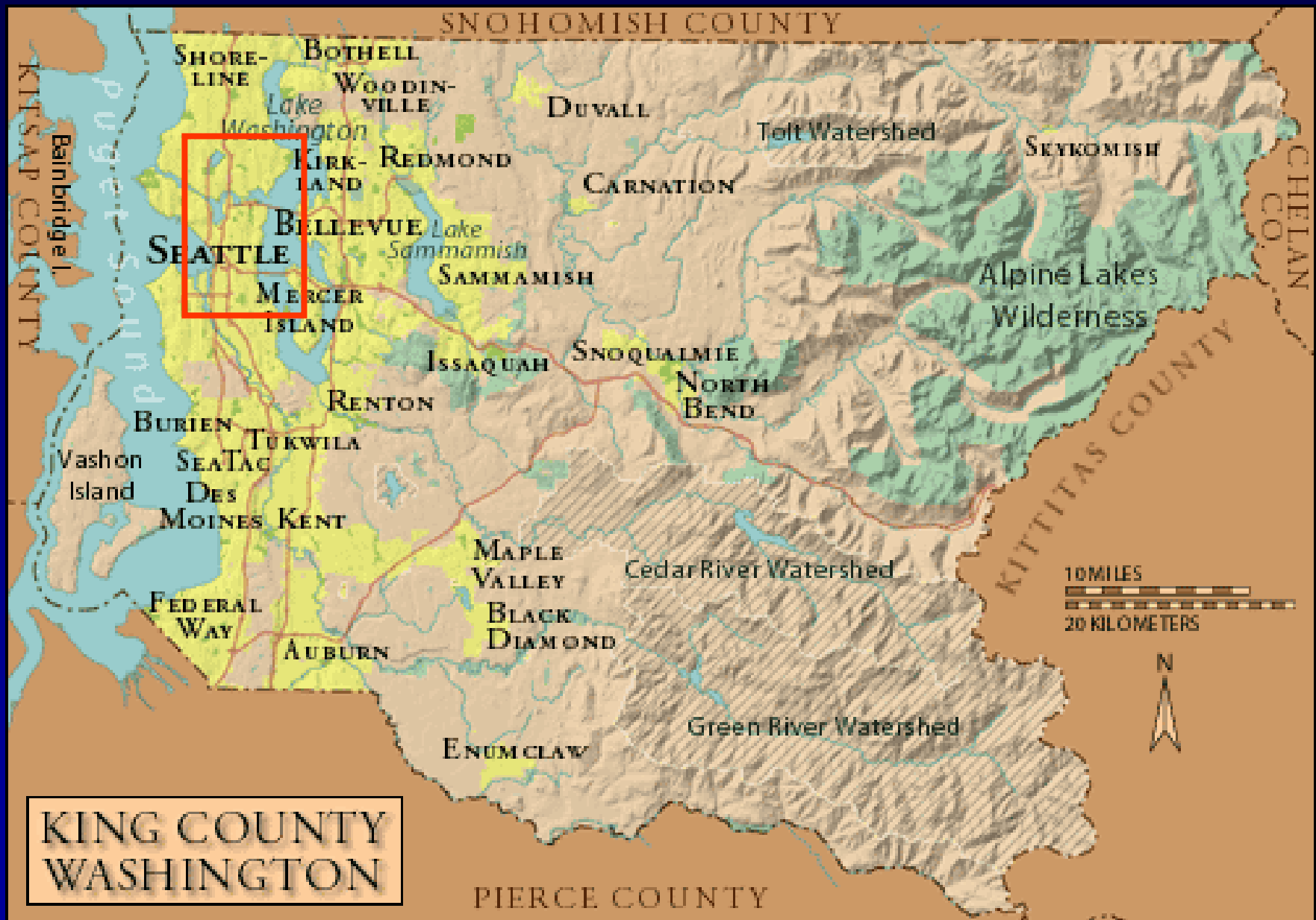


See www.publichealthadvocacy.org

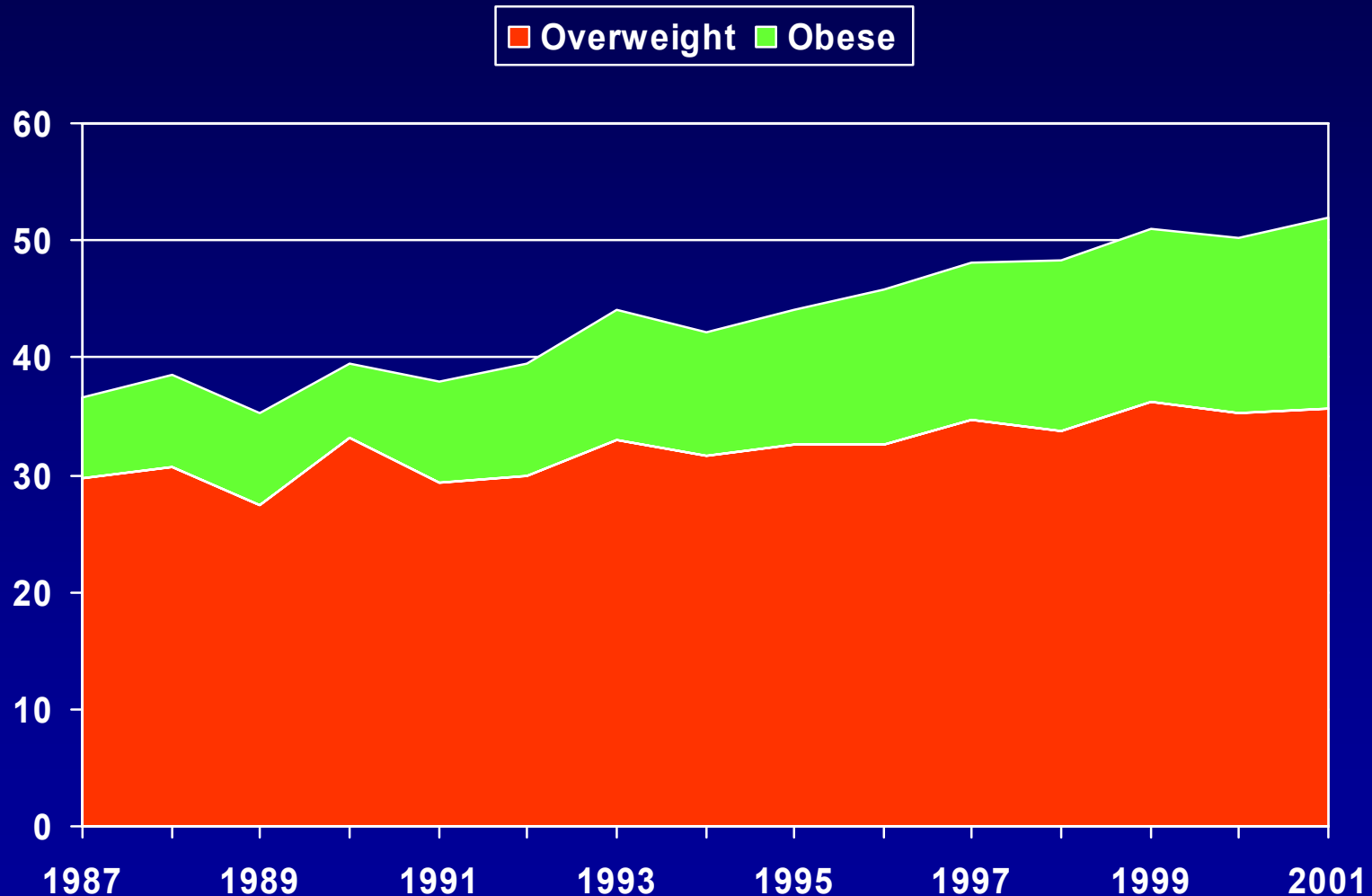
Obesity rates in Seattle & King County

**a Geographic Information Systems
(GIS) approach**

A map of King County, Washington



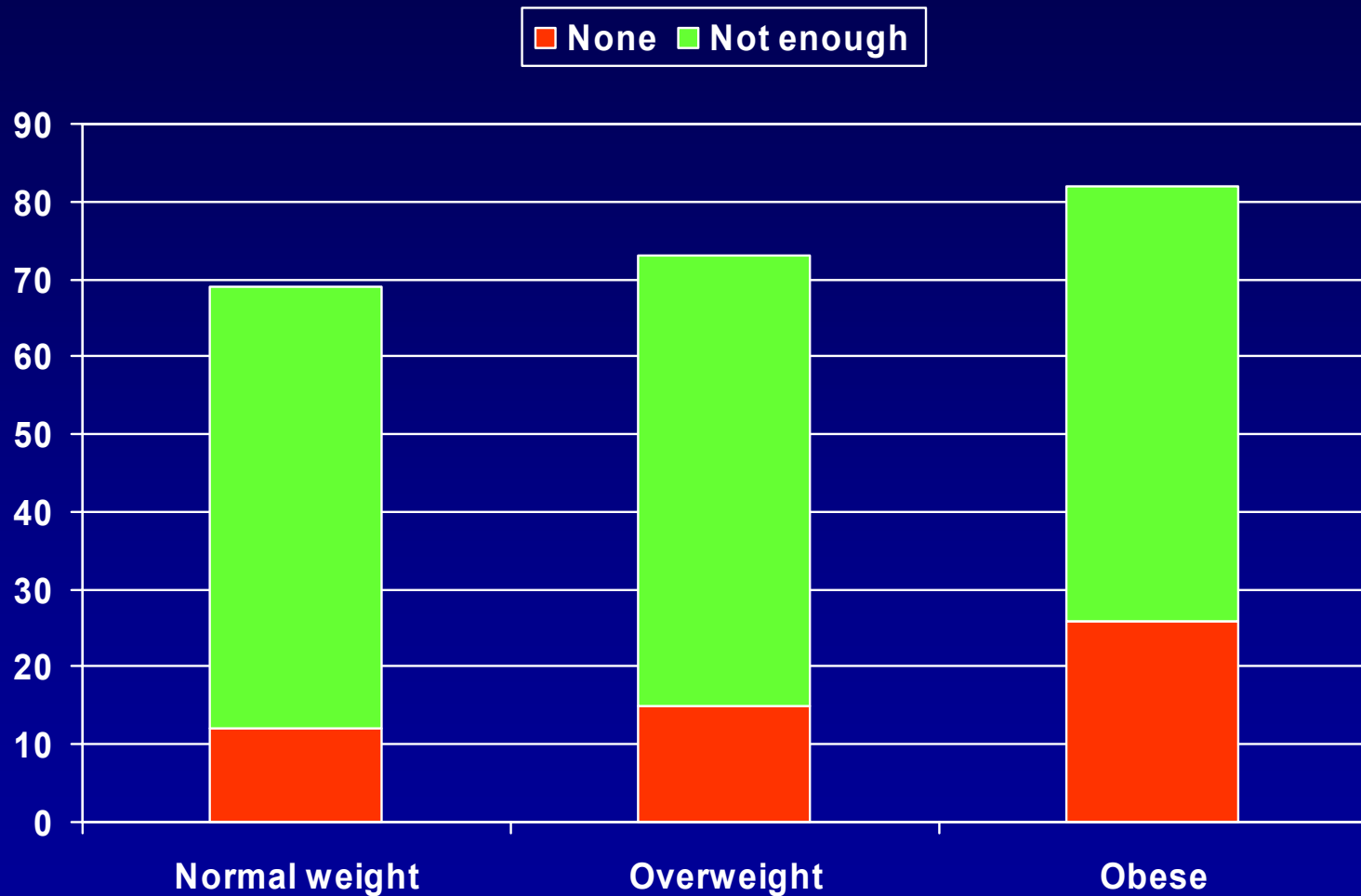
The prevalence of overweight and obesity among King Co. adults 18+, 1987-2001



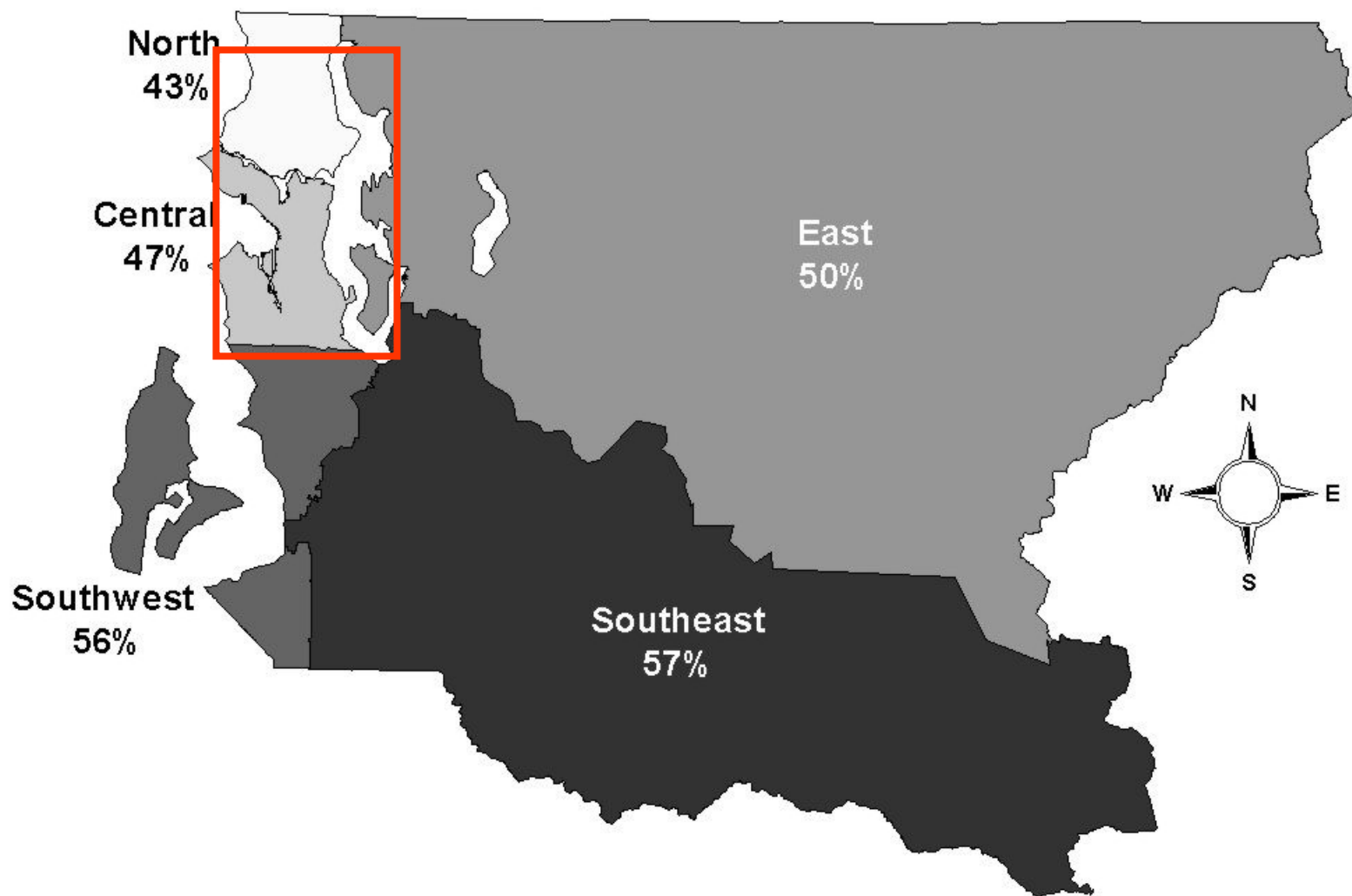
Source: PHSKC Epi Planning & Eval

Physical activity level by weight status

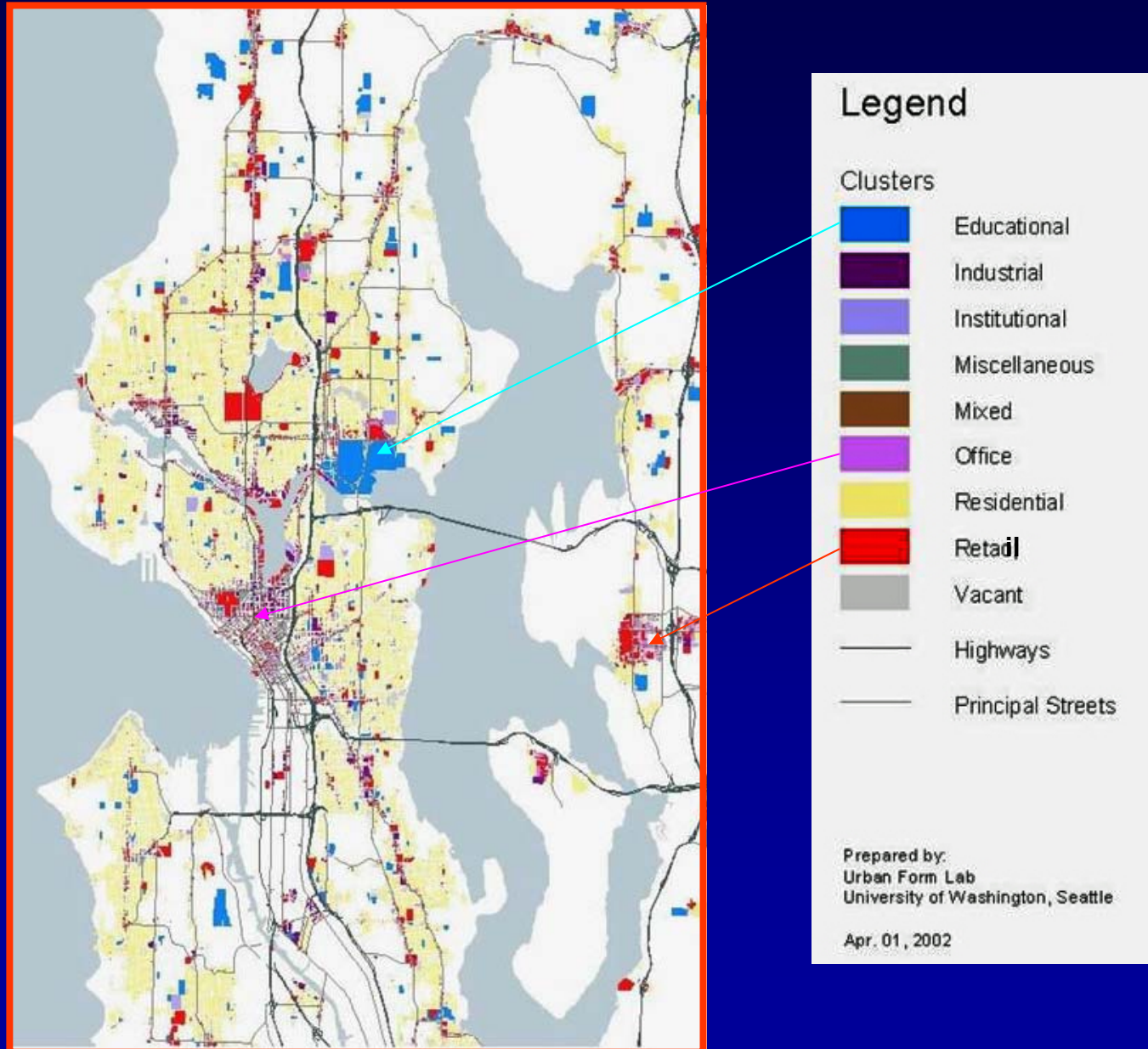
King Co. adults 18+, 1996-2000 data



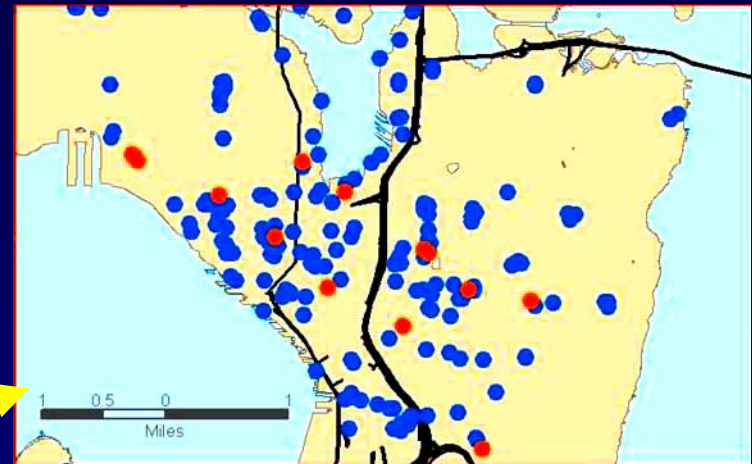
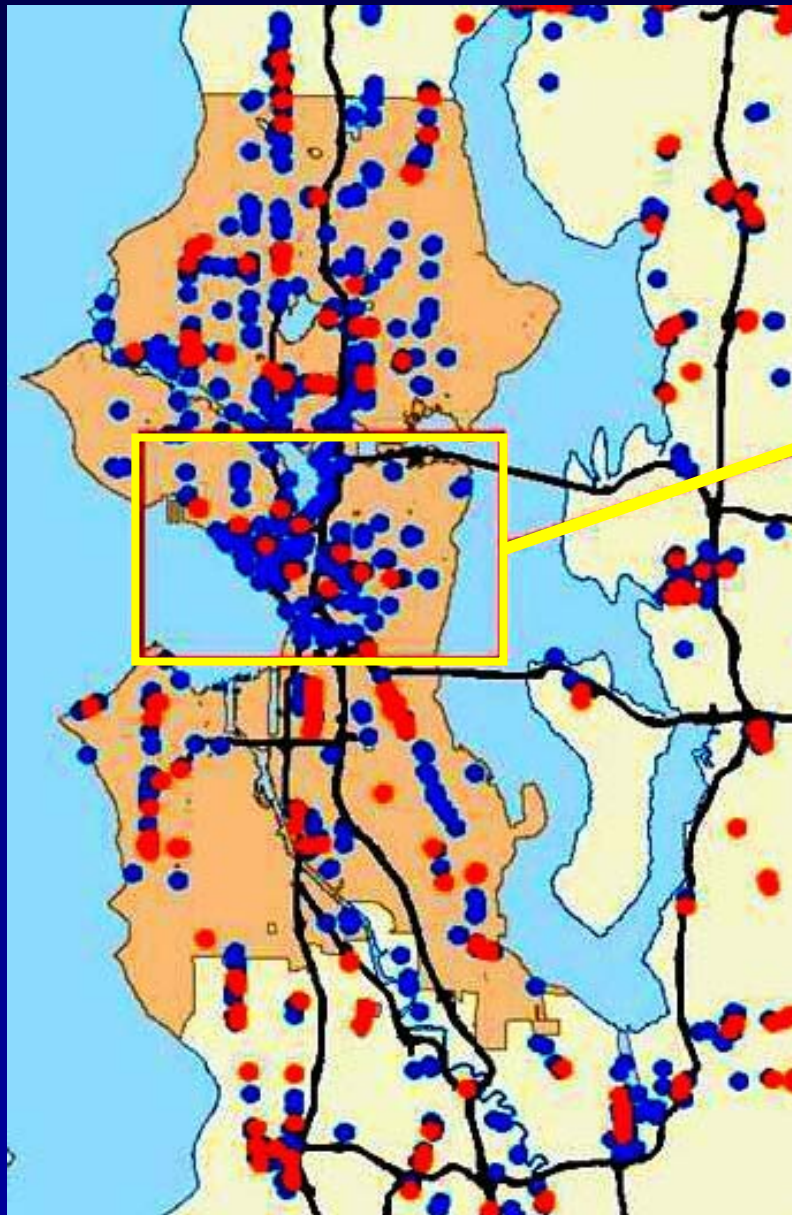
Prevalence of Overweight & Obesity by Region, Age 18 and Over, King County, 1997-2001 Average



Land use patterns in Seattle



Parcels holding restaurants and fast foods



- Fast food parcels
- Restaurant parcels

UW Urban Form Lab; Walk and Bike Communities Project May 04

Central Seattle

- Parks
- Water
- Freeways

Are obesity rates
linked to SES?

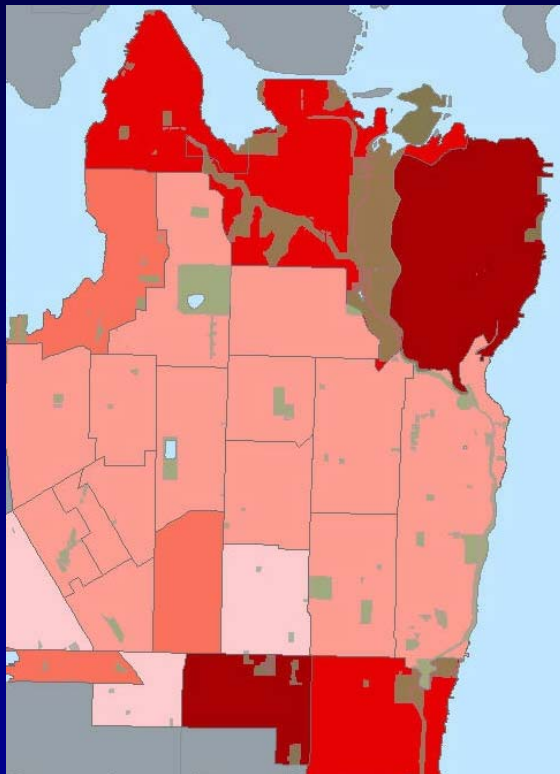
What indices of
income and wealth
can we explore?



Map from Active Living by
Design Community Partnership

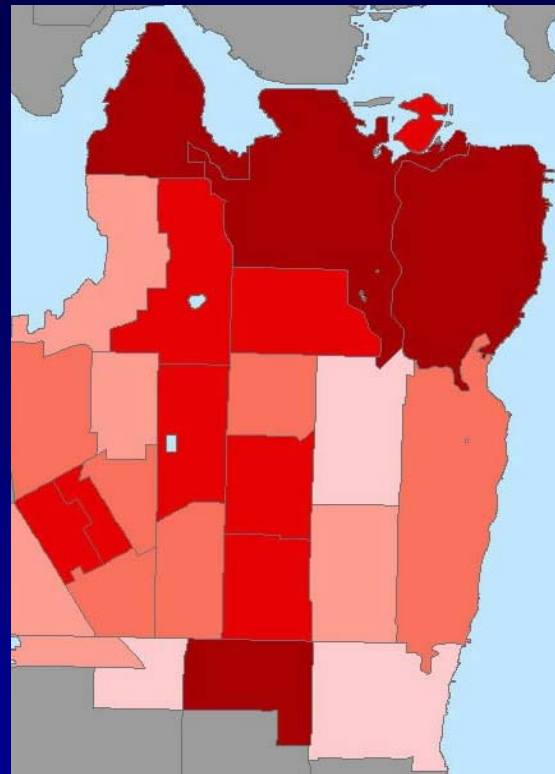
US Census Bureau 1990 Washington State Geospatial Data Archive

Analyzed for Center for Public Health Nutrition by Colin Rehm, May 2004



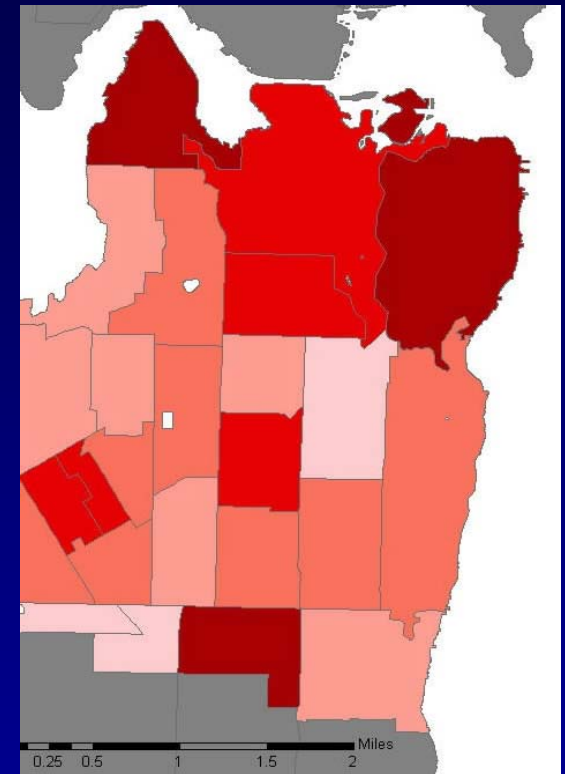
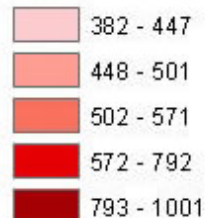
Central Seattle Census Tracts

Median House Value



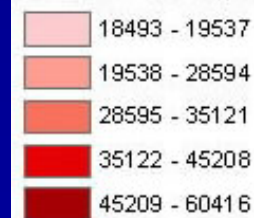
Central Seattle Census Tracts

Mean Cost of Rent



Central Seattle Census Tracts

Median Income, 1990



Real estate sales in Seattle

Data from the
County Assessor

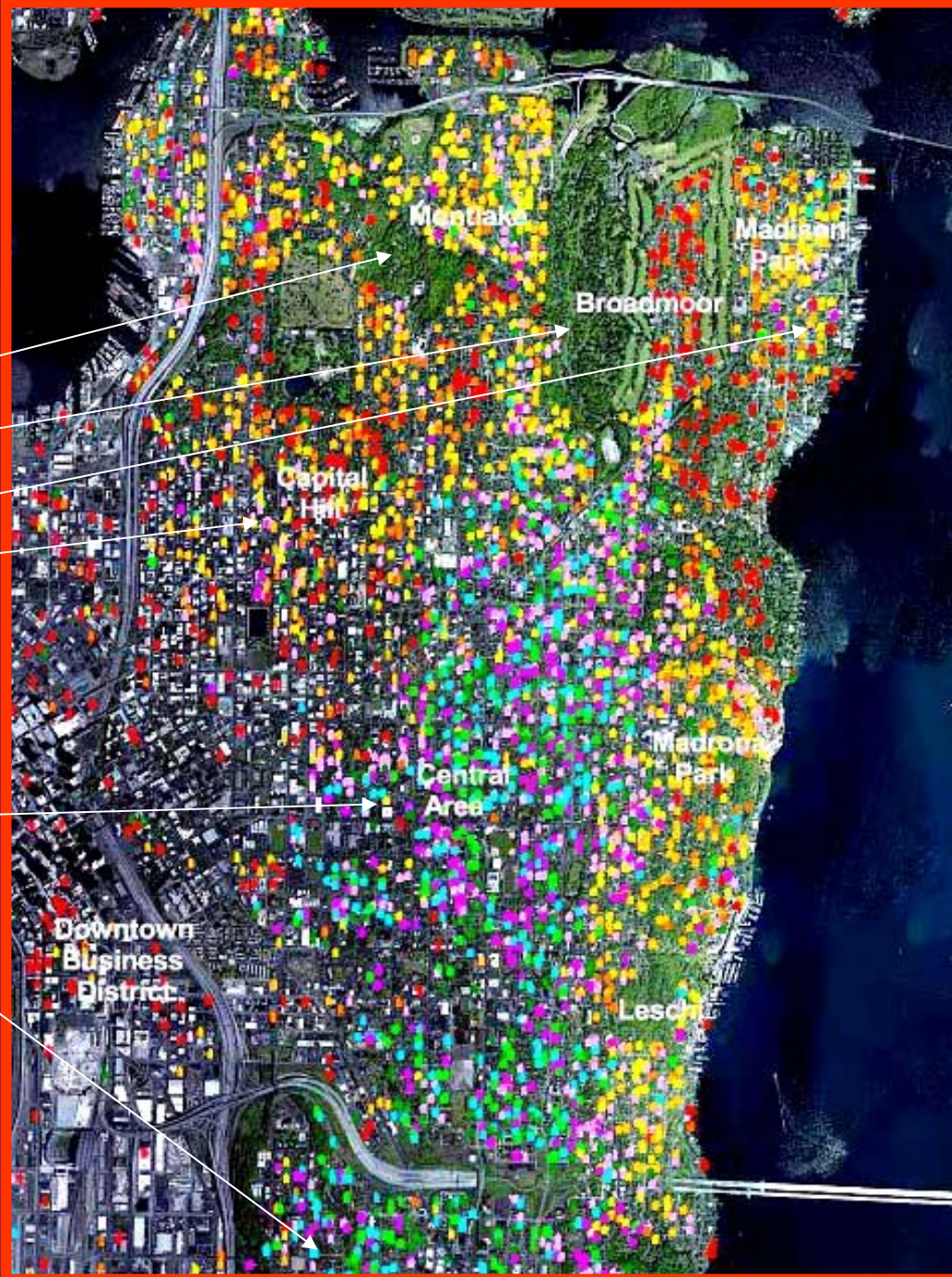
Montlake

Broadmoor

Madison Park

Capitol Hill

Central
Beacon Hill



● >\$1,000,000

● \$150,000

Legend

Sales	
●	\$1,000 - \$149,999
●	\$150,000 - \$199,999
●	\$200,000 - \$249,999
●	\$250,000 - \$299,999
●	\$300,000 - \$399,999
●	\$400,000 - \$499,999
●	\$500,000 - \$749,999
●	\$750,000 - \$999,999
●	\$1,000,000 - \$1,000,000,000

- Residential
- Commercial

Real estate sales in Seattle

Data from the
County Assessor

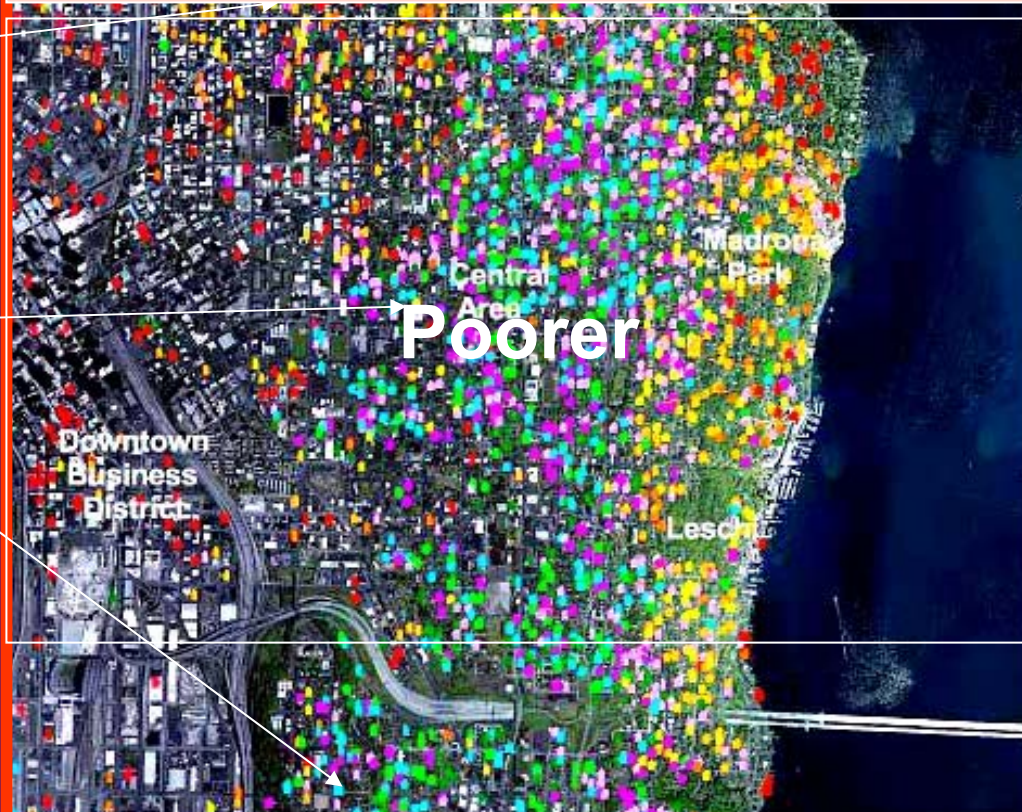
Montlake
Broadmoor
Madison Park
Capitol Hill

Central
Beacon Hill

Richer

○ >\$1,000,000

● \$150,000

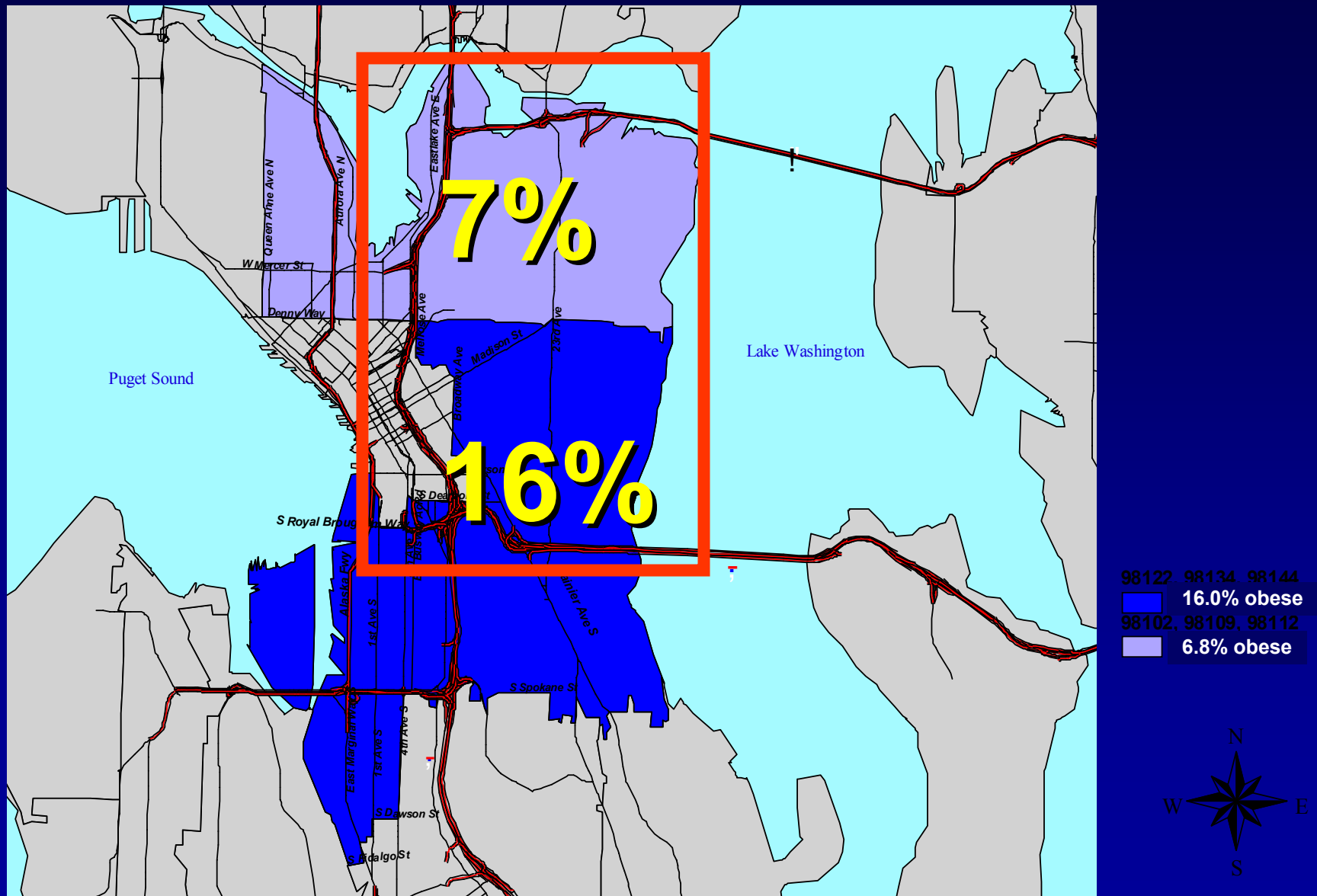


Legend

Sales	
\$1,000 - \$149,999	●
\$150,000 - \$199,999	●
\$200,000 - \$249,999	●
\$250,000 - \$299,999	●
\$300,000 - \$349,999	●
\$350,000 - \$399,999	●
\$400,000 - \$449,999	●
\$450,000 - \$499,999	●
\$500,000 - \$549,999	●
\$550,000 - \$599,999	●
\$600,000 - \$649,999	●
\$650,000 - \$699,999	●
\$700,000 - \$749,999	●
\$750,000 - \$799,999	●
\$800,000 - \$849,999	●
\$850,000 - \$899,999	●
\$900,000 - \$949,999	●
\$950,000 - \$999,999	●
\$1,000,000 - \$1,000,000,000	●

■ Residential
■ Commercial

Obesity rates by zipcode: Seattle BRFSS data 1998-2002



Created by: Epidemiology, Planning & Evaluation, 5/04
Data source: Behavioral Risk Factor Surveillance System, 1998-2002
Obese is defined as individuals with a Body Mass Index (BMI) of 30 or greater

Analyzed by PHSKC Epi Planning & Evaluation 5/04

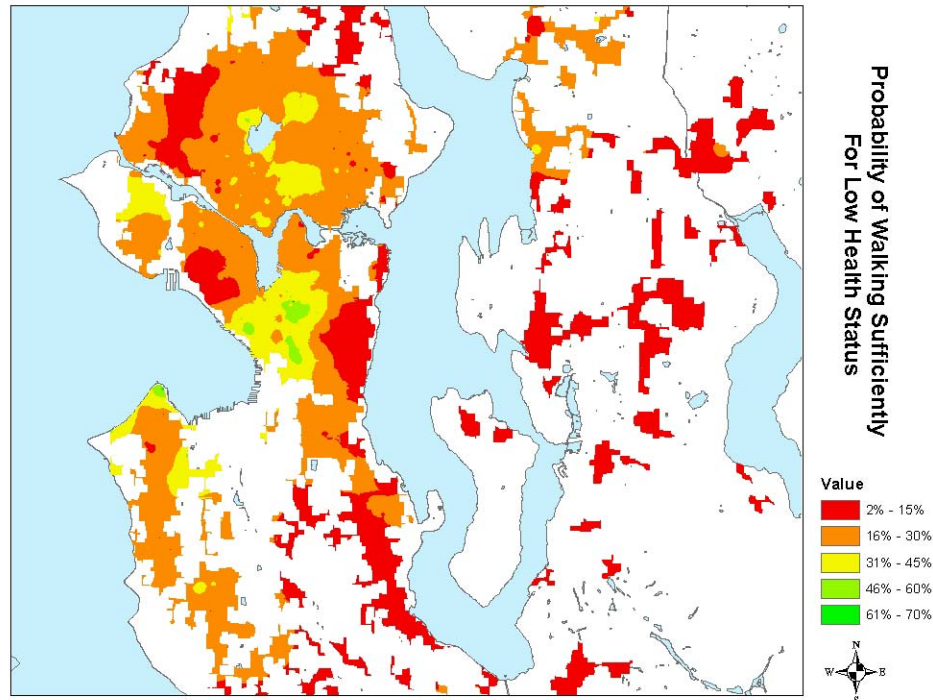
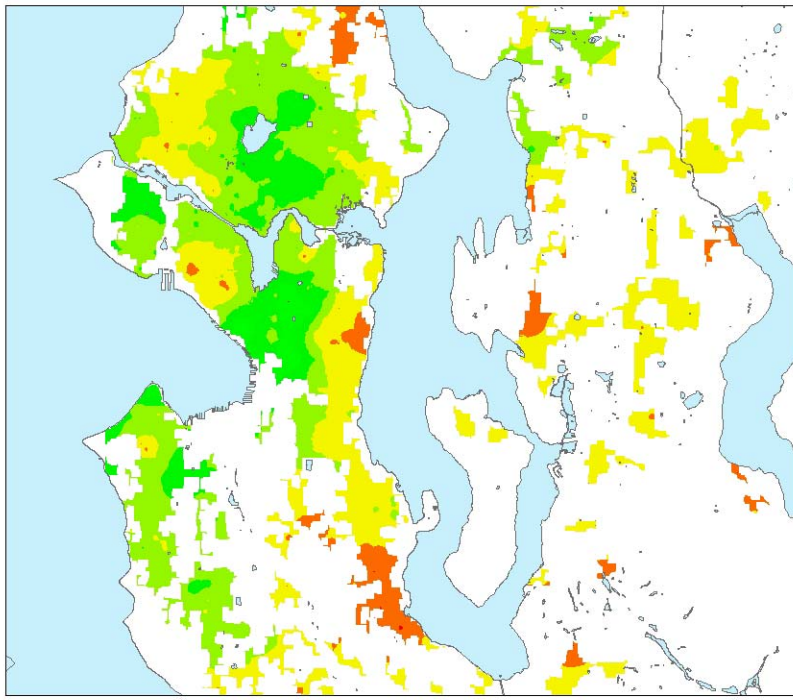
We need research to link GIS data with individual PA and dietary behaviors

Walk and Bike Communities Project Urban Form Lab May 04

Probability of walking >150 min/wk by self-reported health status

HIGH

LOW



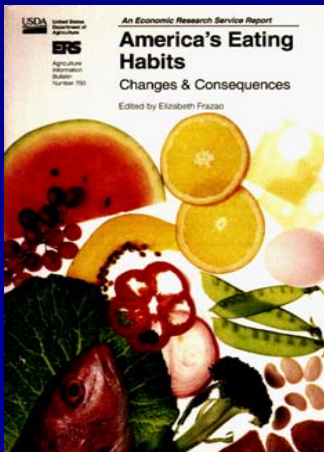
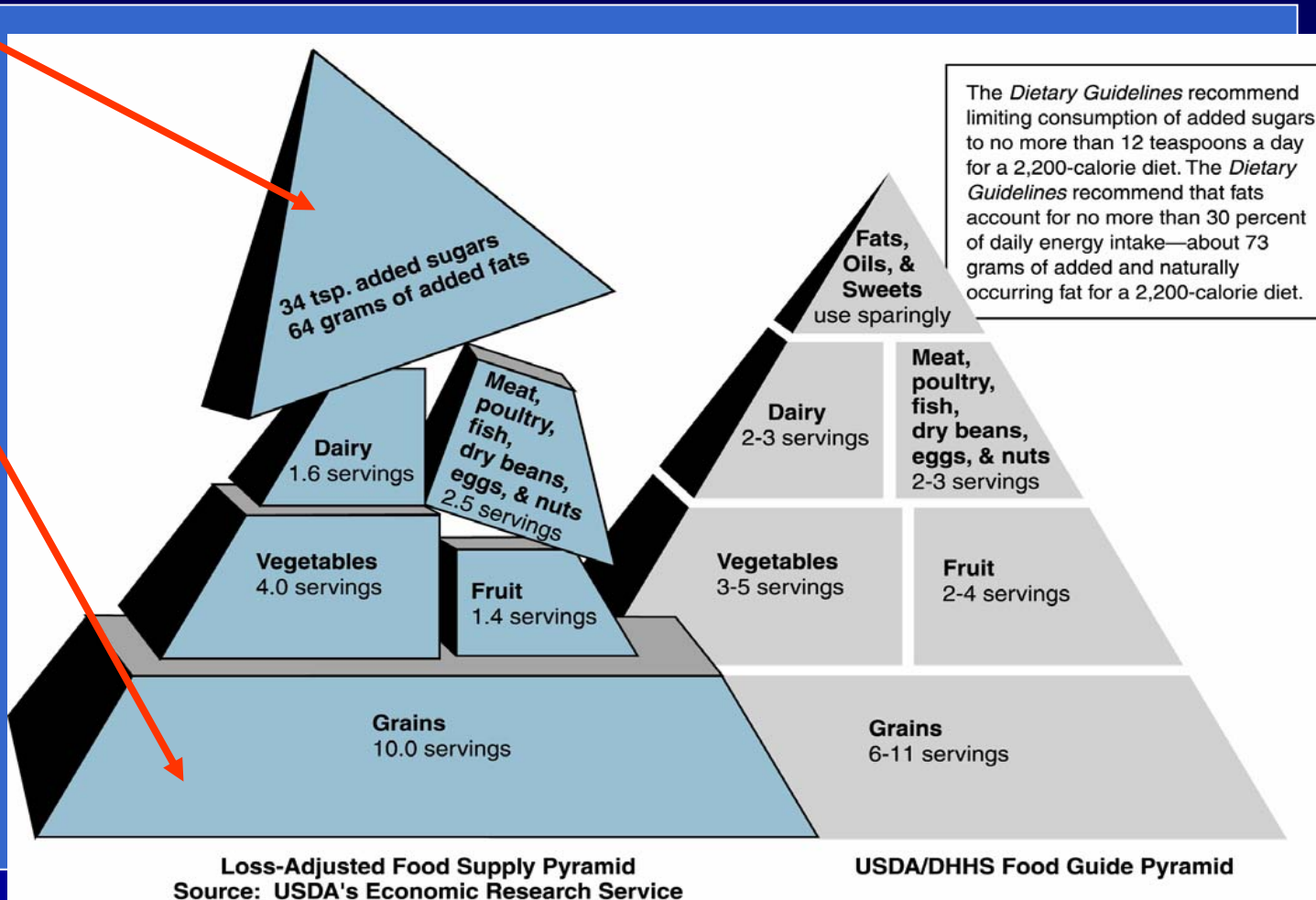
**In addition to access,
what about the affordability of
healthy diets?**

**Why do we consume so much
sugar and fat?**

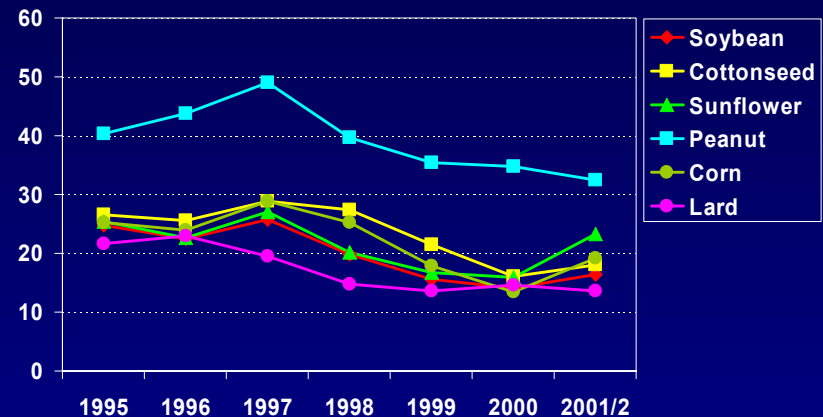
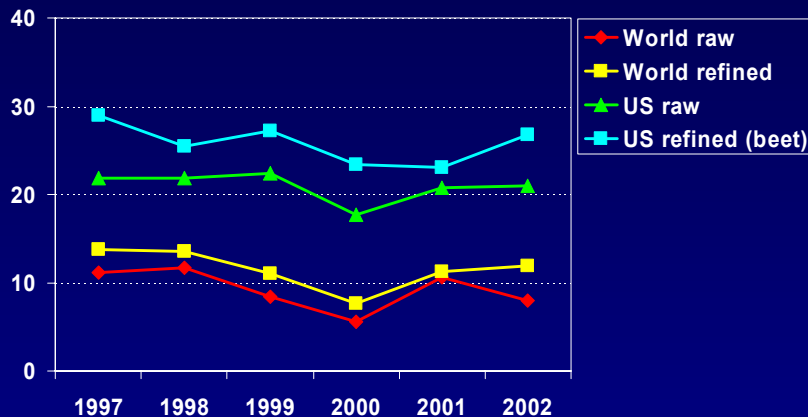
Eating habits do not follow the Food Guide Pyramid — could cost be the reason?

Source: Frazao, ERS/USDA 2002

Added sugars
Added fats
Grains



World and US prices for raw and refined sugar and for fats and oils 1997-2002 (cents per lb)



- At world prices, sugar provides 20,000 kcal per dollar.
- Fats and oils provide another 20,000 kcal per dollar
- Nutritionists equate 3,500 kcal with 1 lb of body wt
- The “net cost” of gaining 1 lb bwt from sugar and fat is 12 cents
- The US diet derives 40% of energy from added sugars and fats

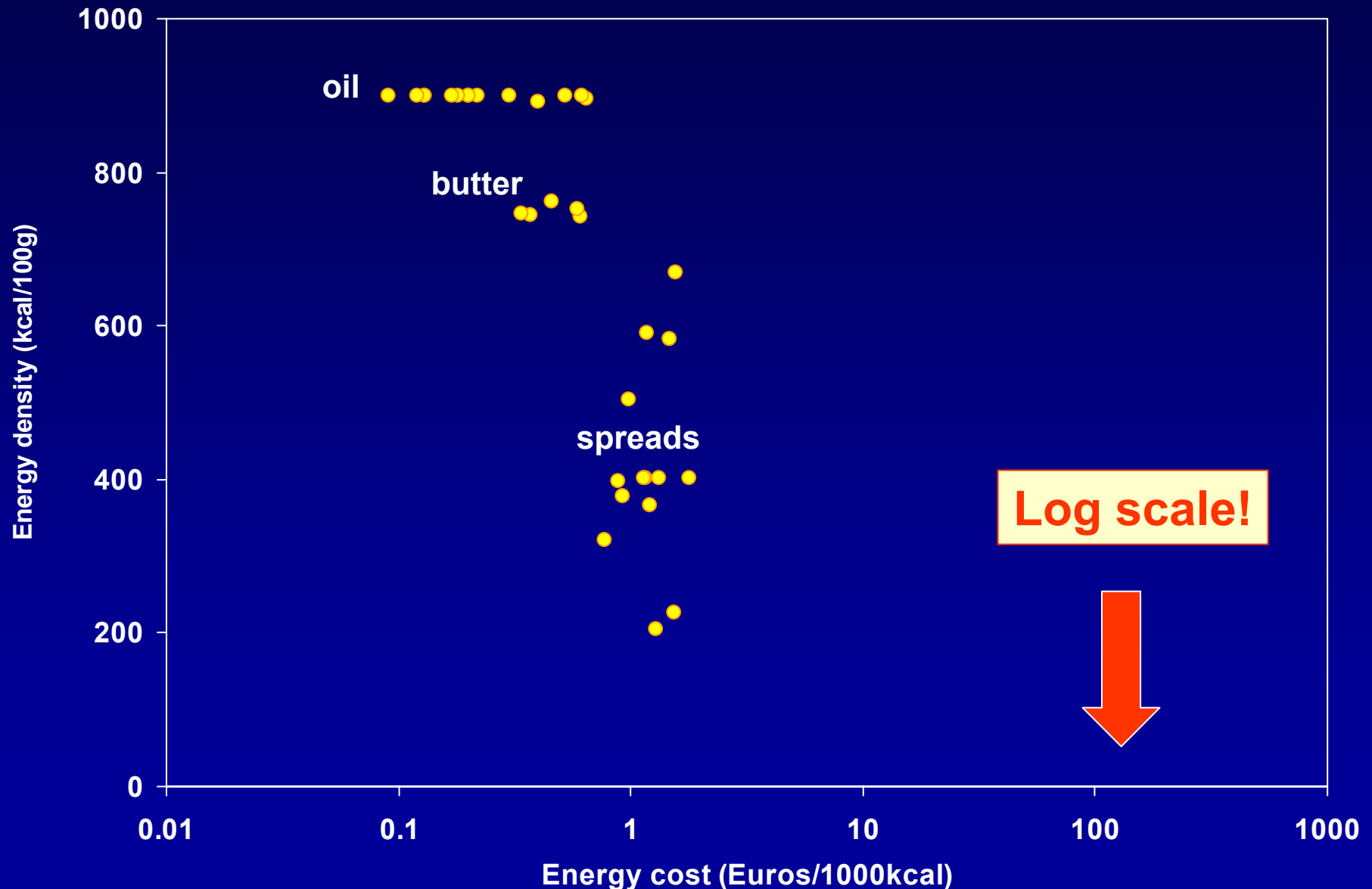
**What do different foods cost per
calorie?**

**Energy cost:
\$ or Euros per 1000 kcal**

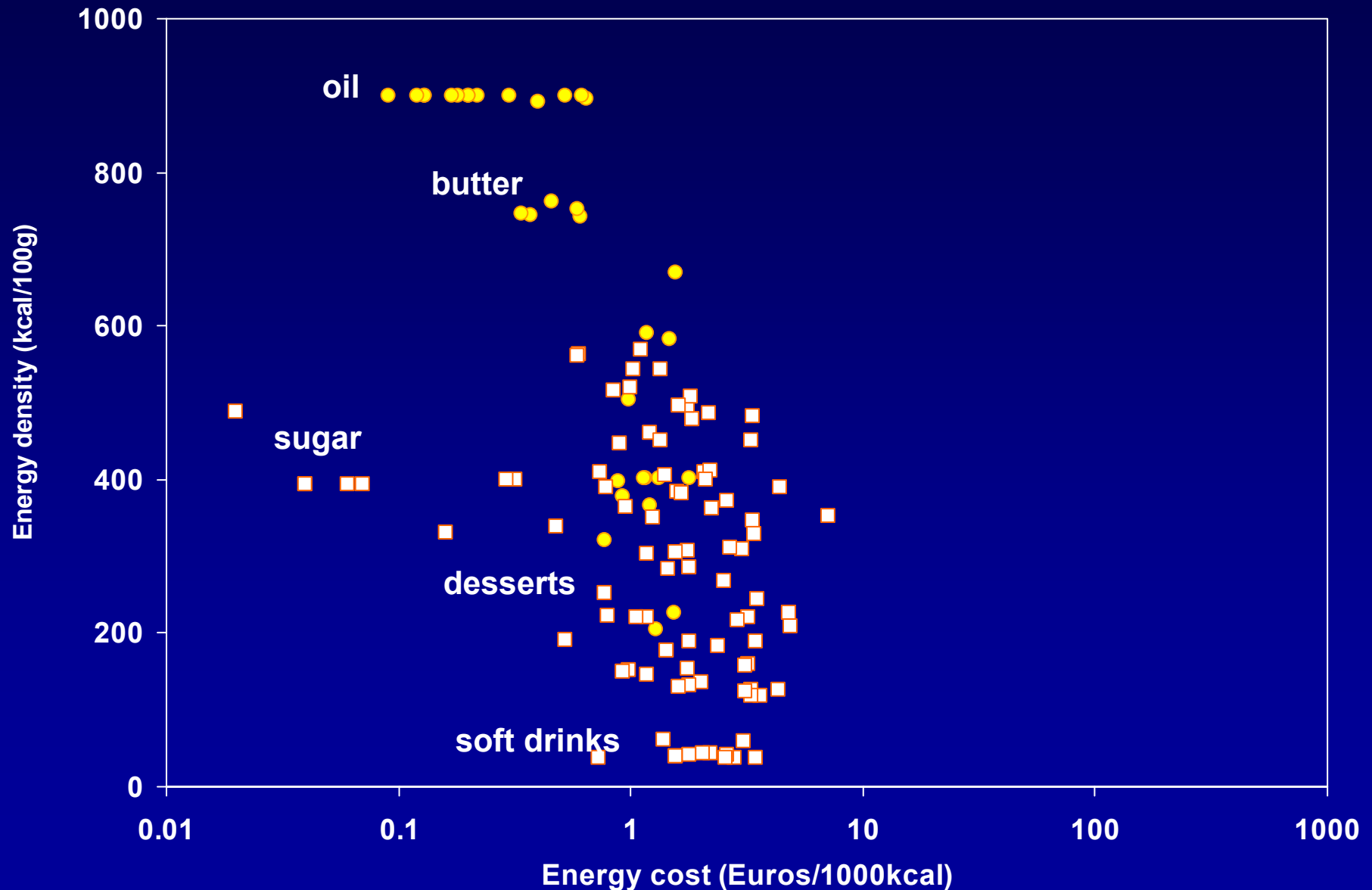
A longitudinal cohort of French adults

- The SUVIMAX study: an 8-year clinical trial of more than 12,000 French men and women
- Examined the impact of **SU**pplementation with **V**itamins and **M**inerals on disease risk
- For each of the 913 foods in the database
 - Energy density (kcal/100g) calculated using food composition tables
 - Mean cost per kg obtained from the French National Institute for Economic Research (INSEE) corresponding to mean national price for that item
 - Mean cost per edible portion calculated
- Energy density (kcal/100g) plotted against energy cost (Euros/1000kcal)

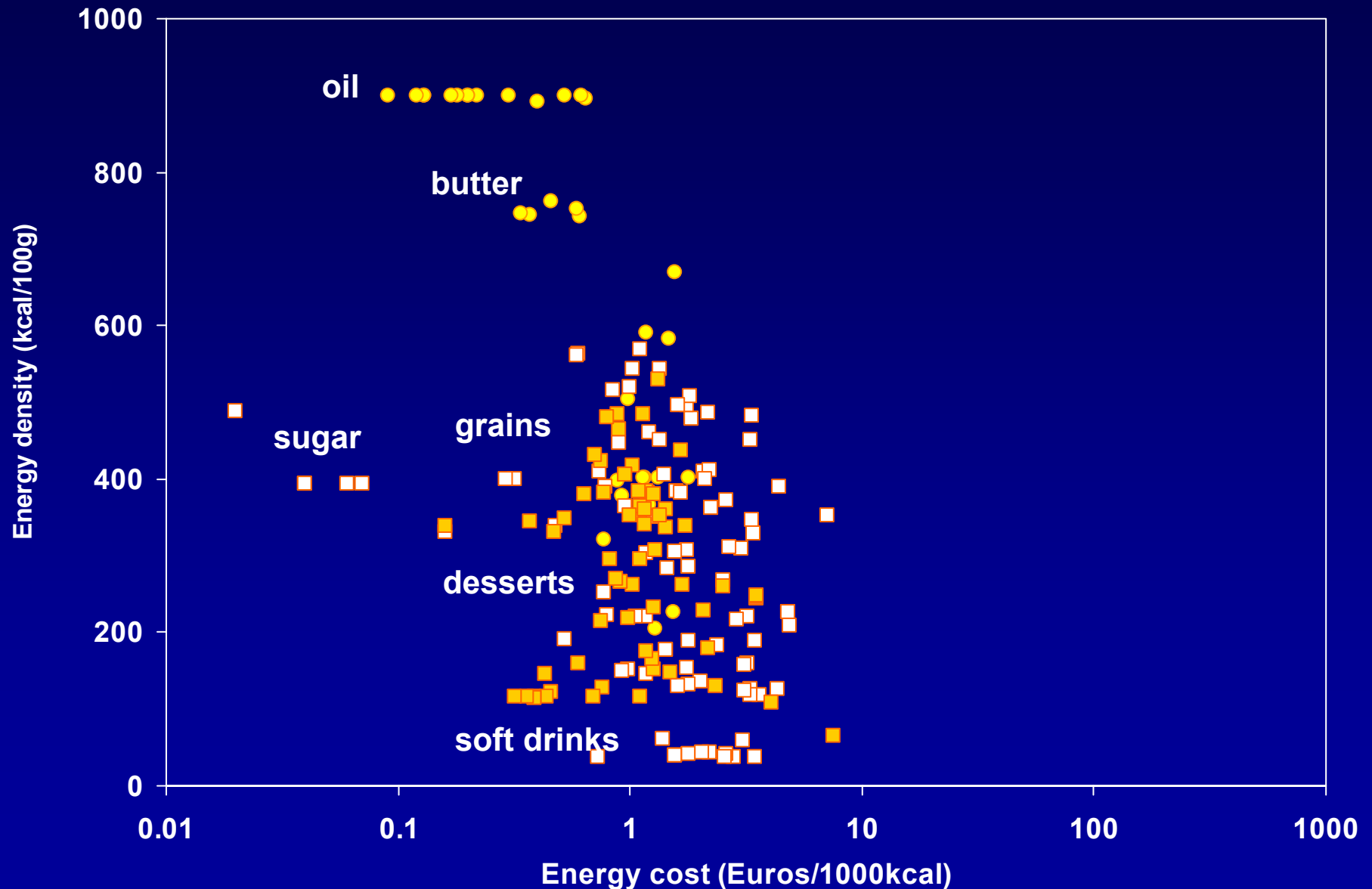
Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



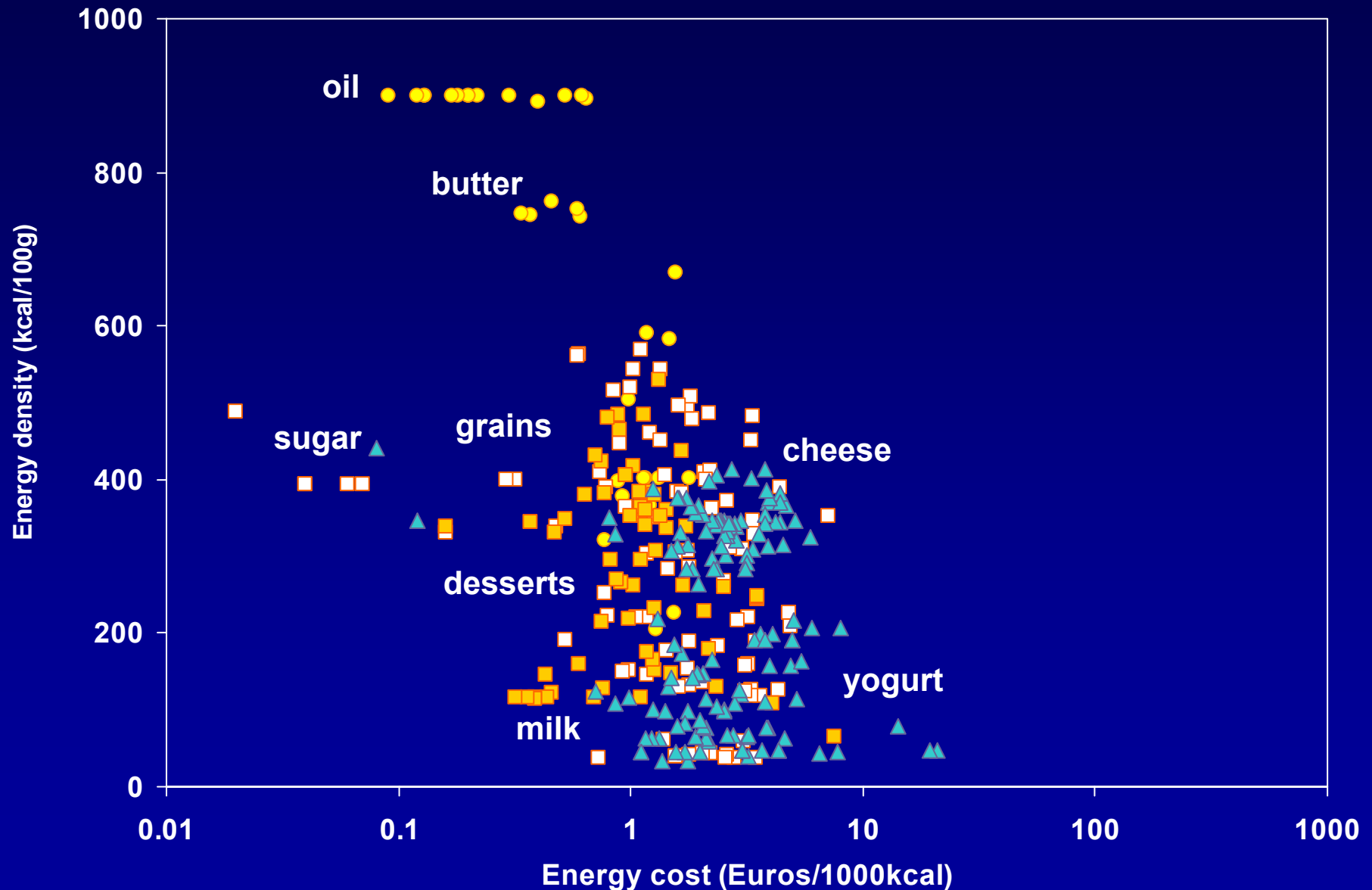
Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



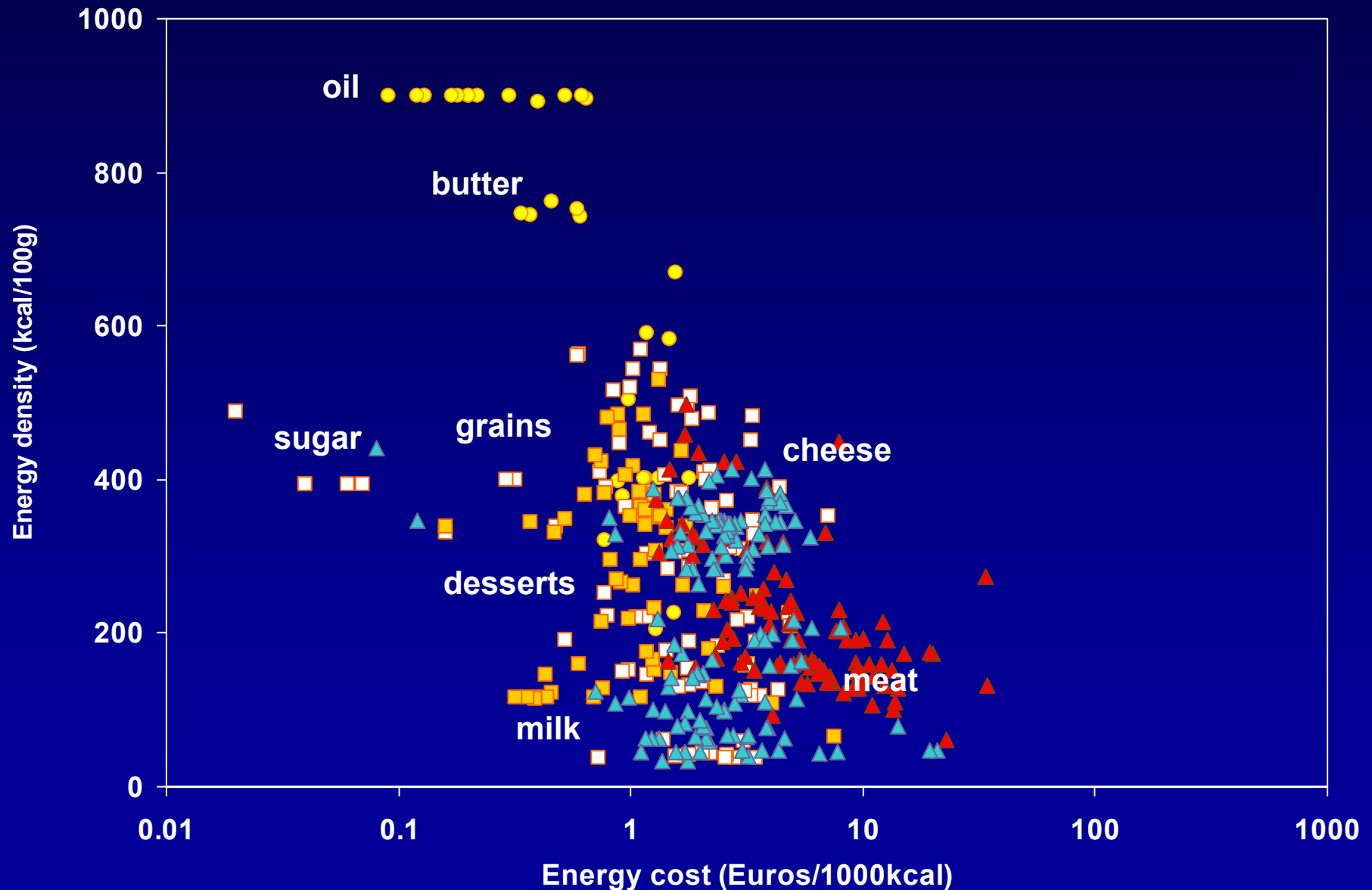
Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



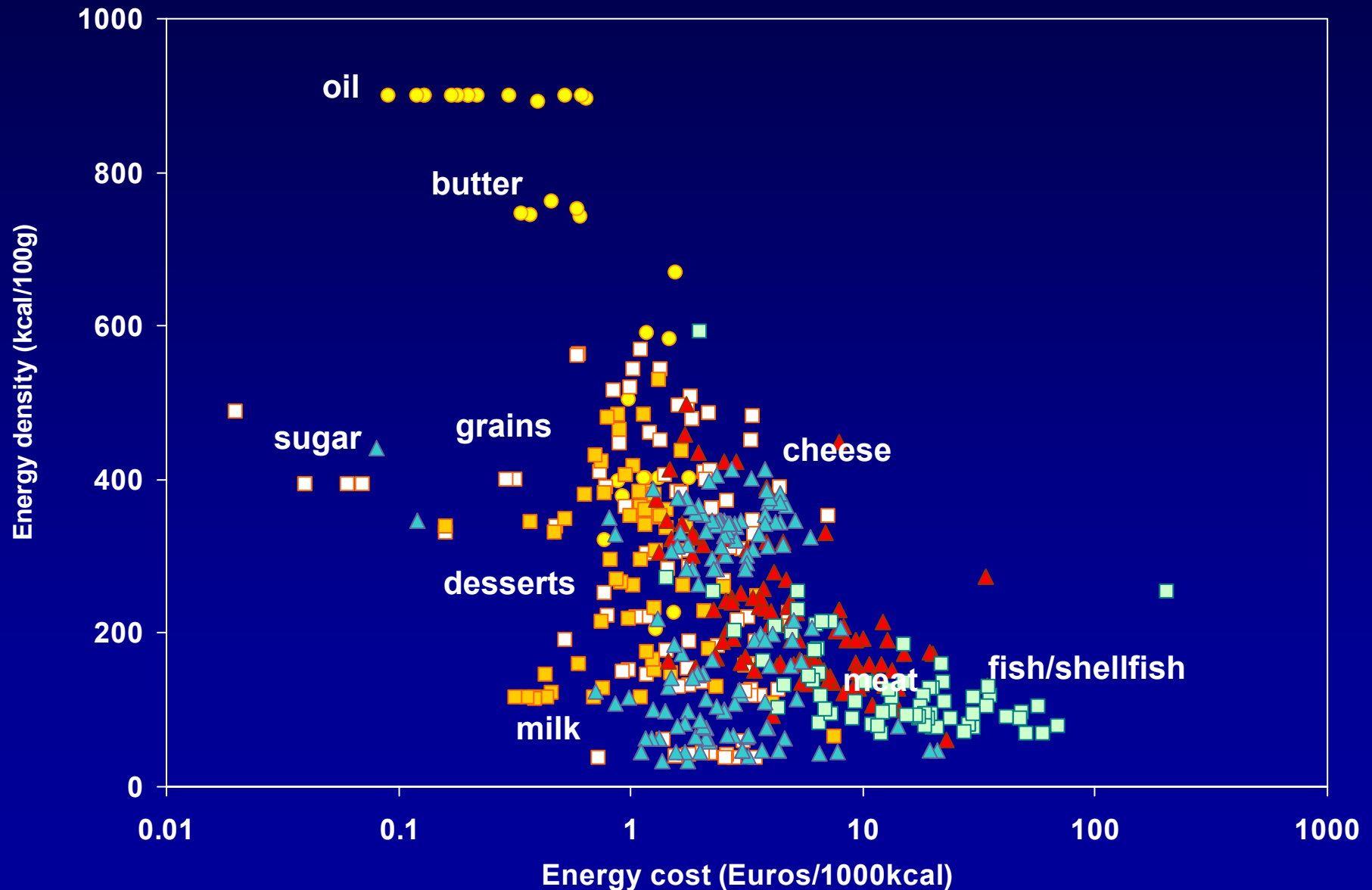
Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



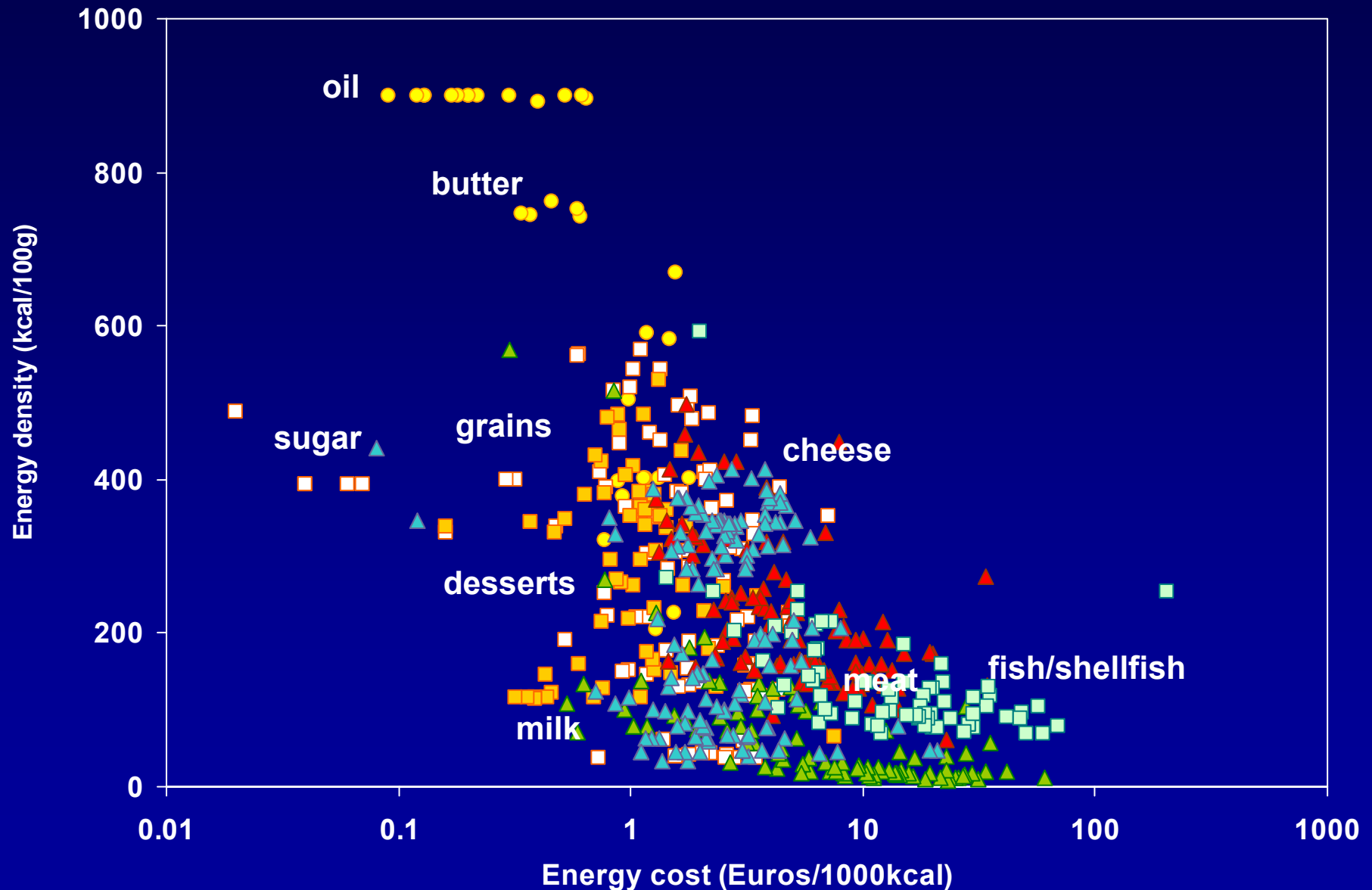
Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



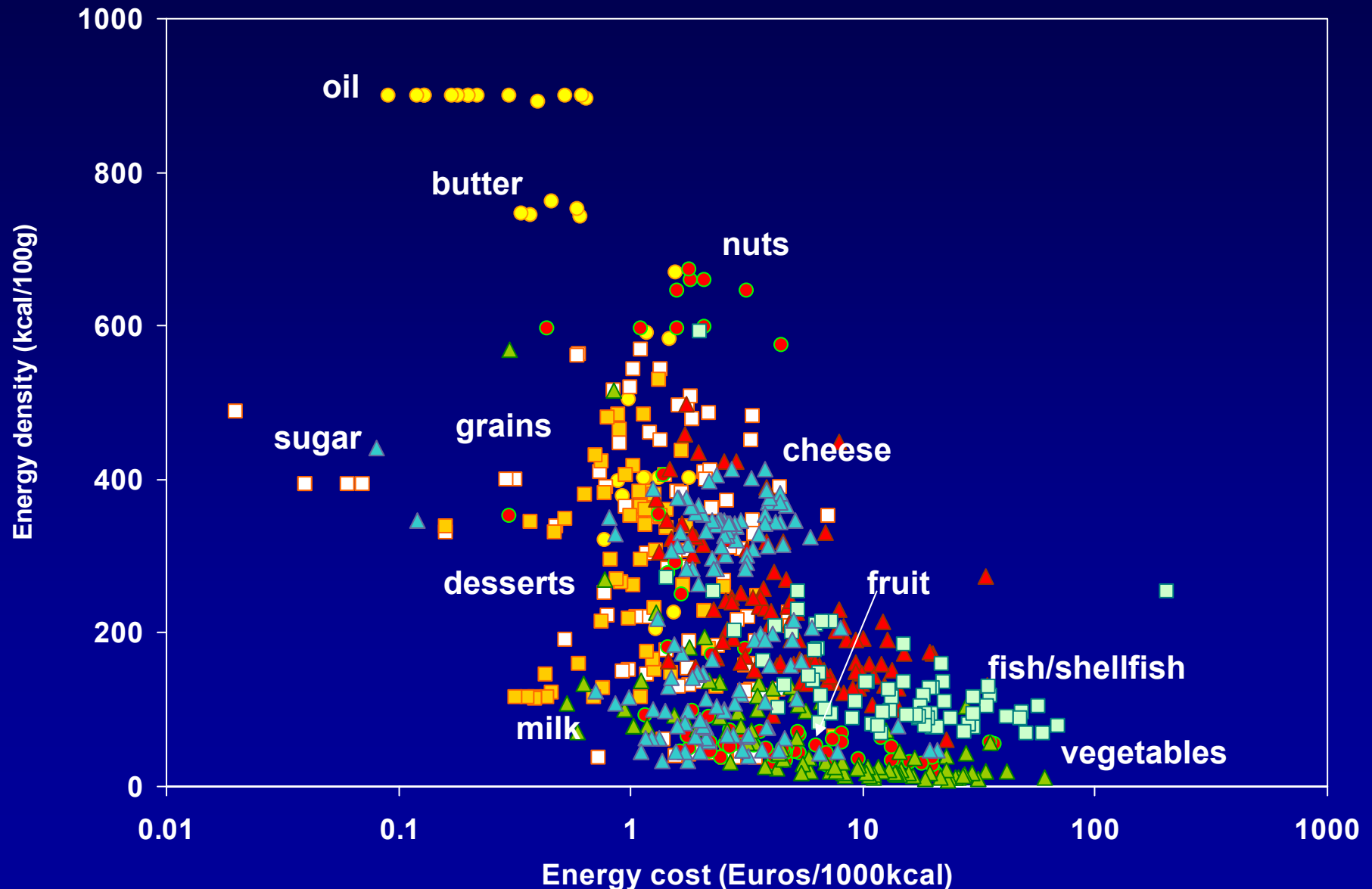
Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



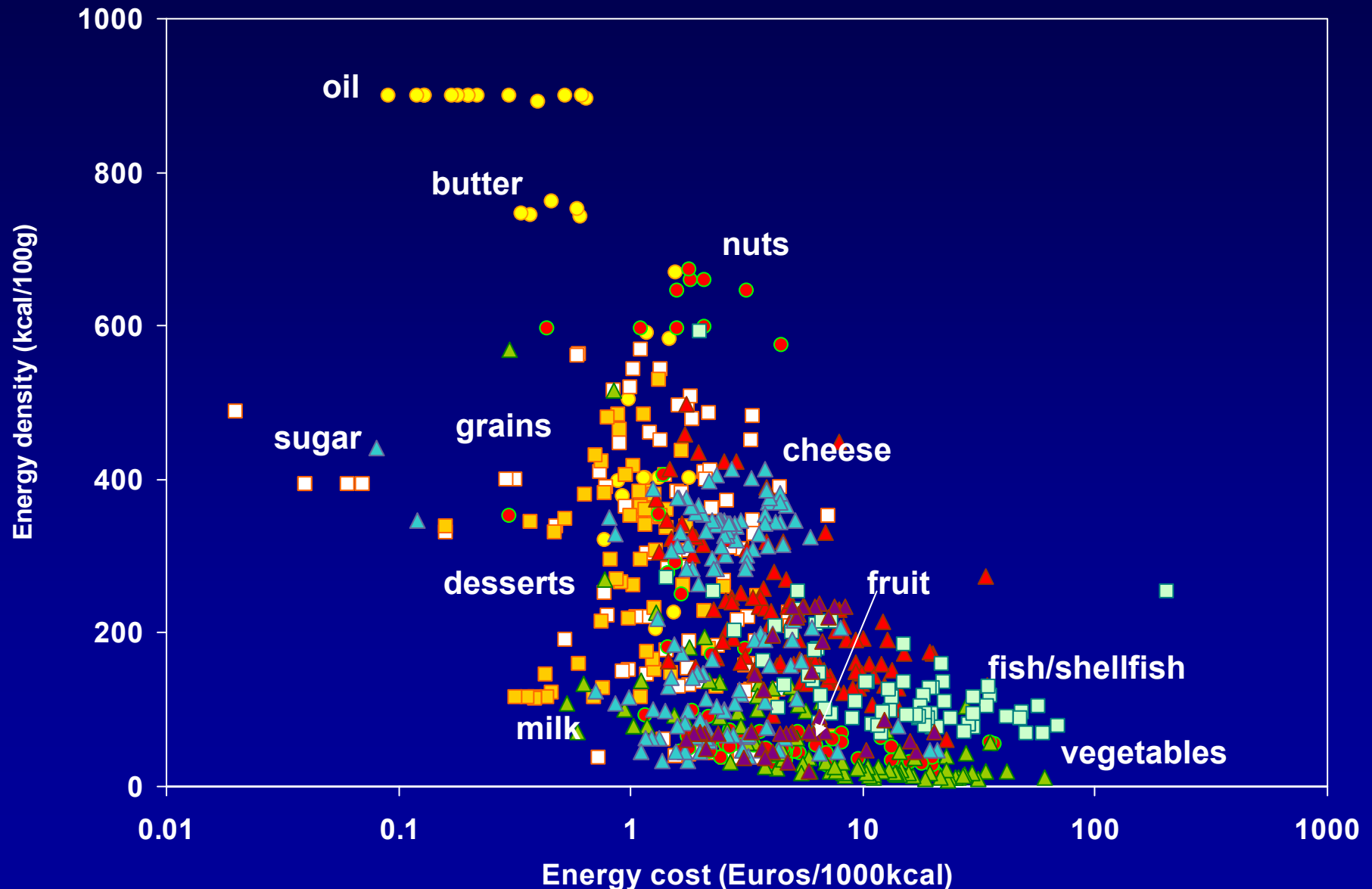
Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



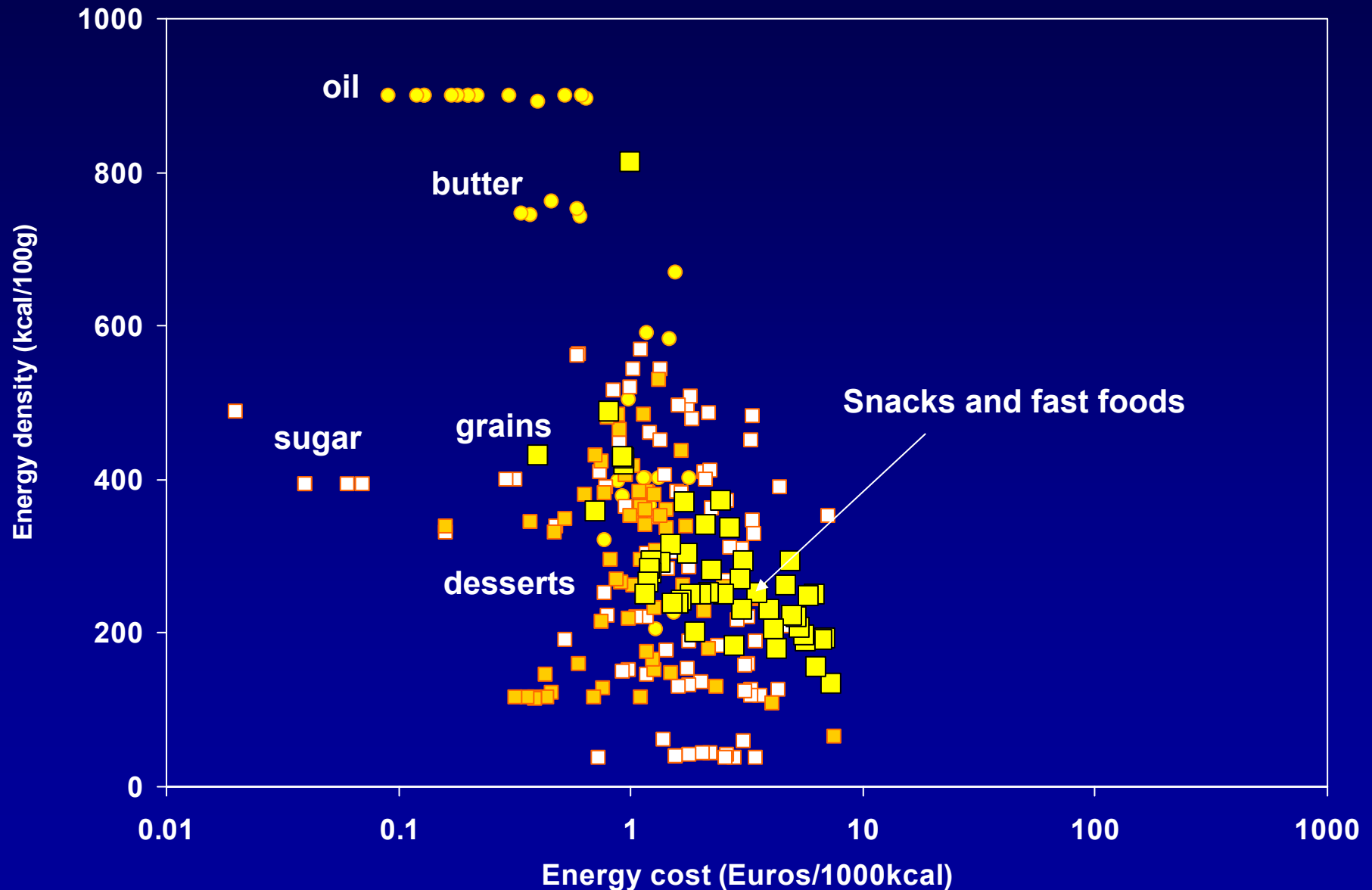
Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset



Energy density (kcal/100g) and energy cost (Euros/1000kcal) in the SUVIMAX dataset

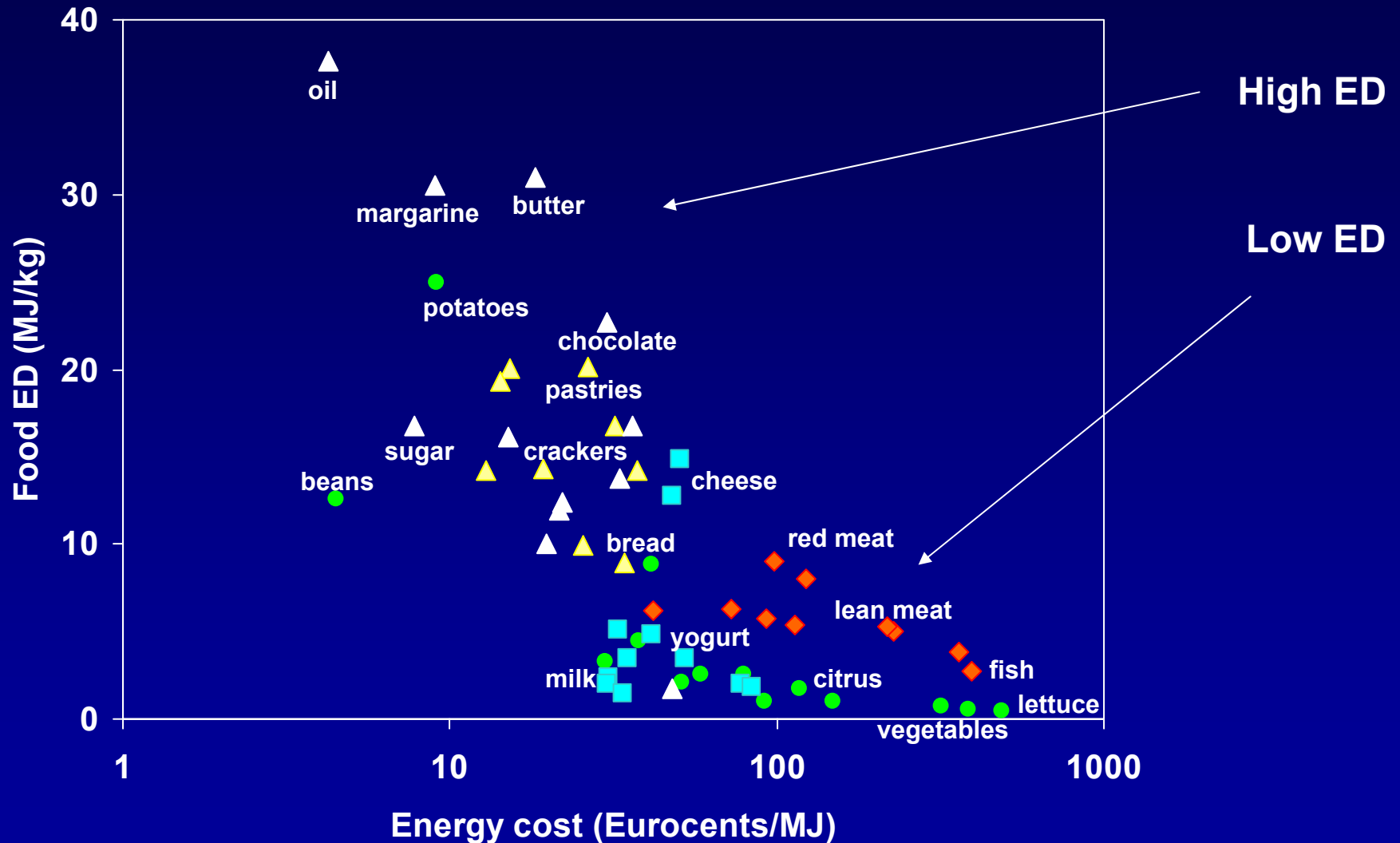


**If healthier *foods* cost more, so
must healthier *diets***

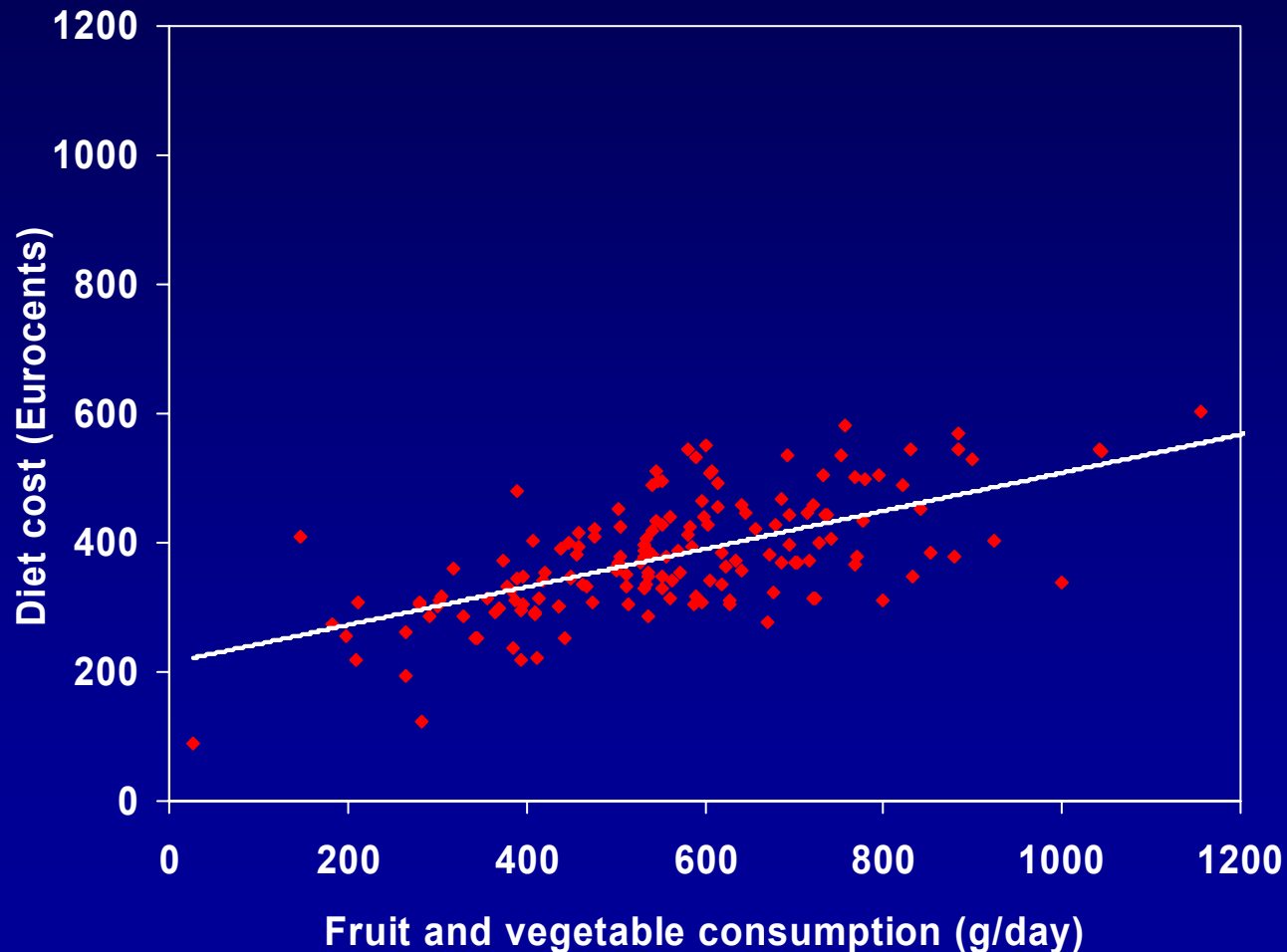
A community study of French adults

- **Val-de-Marne data: 361 adult men and 476 women**
- **For each of the 57 foods in the database**
 - **Mean cost per kg obtained from the French National Institute for Economic Research (INSEE) corresponding to mean national price for that item**
 - **Mean cost per kg multiplied by amount consumed**
 - **Data summed over all foods to yield diet cost**
- **This gave us estimated diet costs for each person**
- **We then examined the relationship between diet structure (foods and nutrients) and diet cost**
- **Darmon, Briend, Drewnowski Public Health Nutrition 2004**
- **Drewnowski, Briend, Darmon. Am J Public Health 2004 (in press)**
- **Darmon, Ferguson, Drewnowski, Briend. Rome Nutrition Congress 2003**

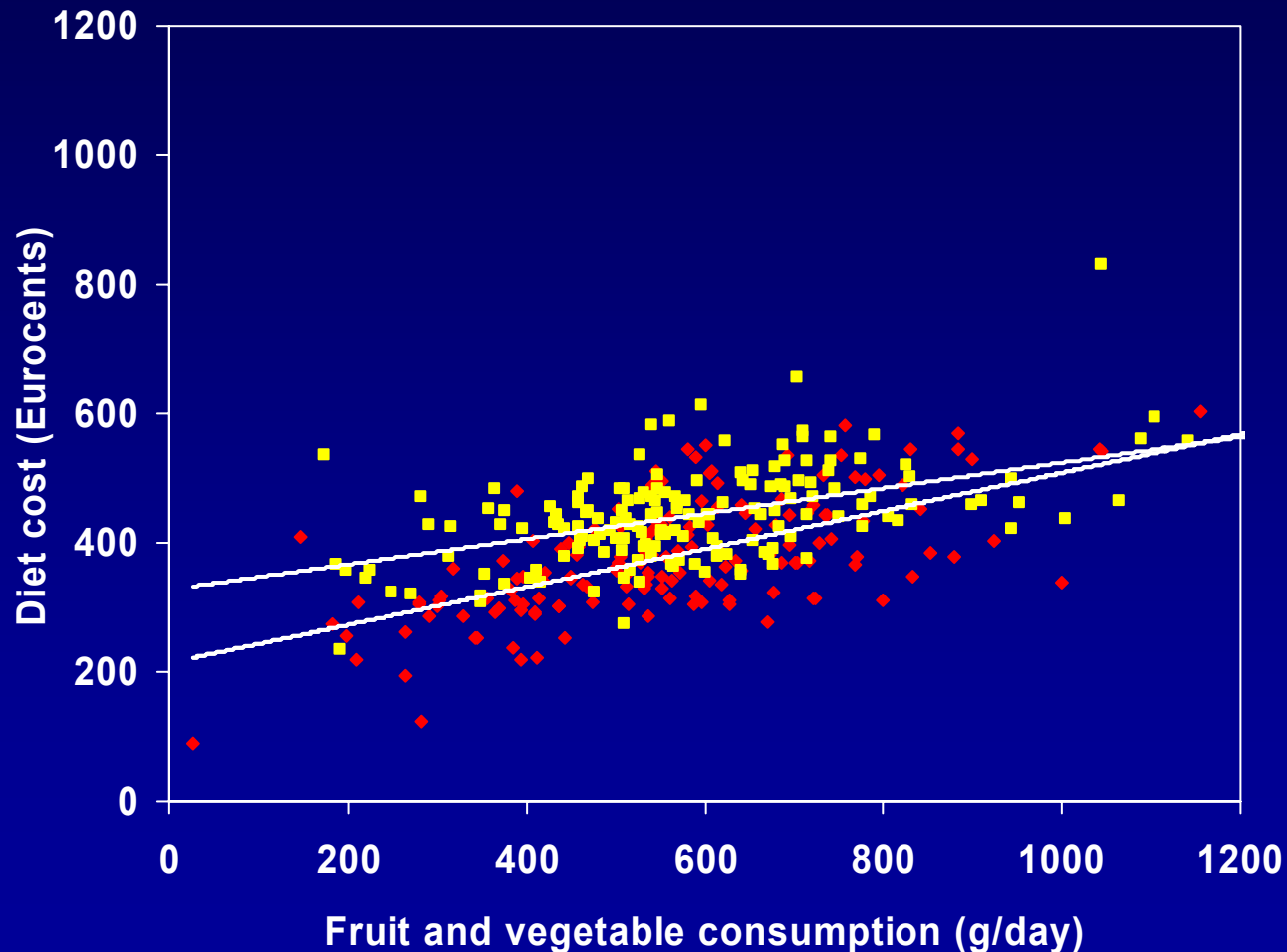
Energy dense foods = lower energy costs



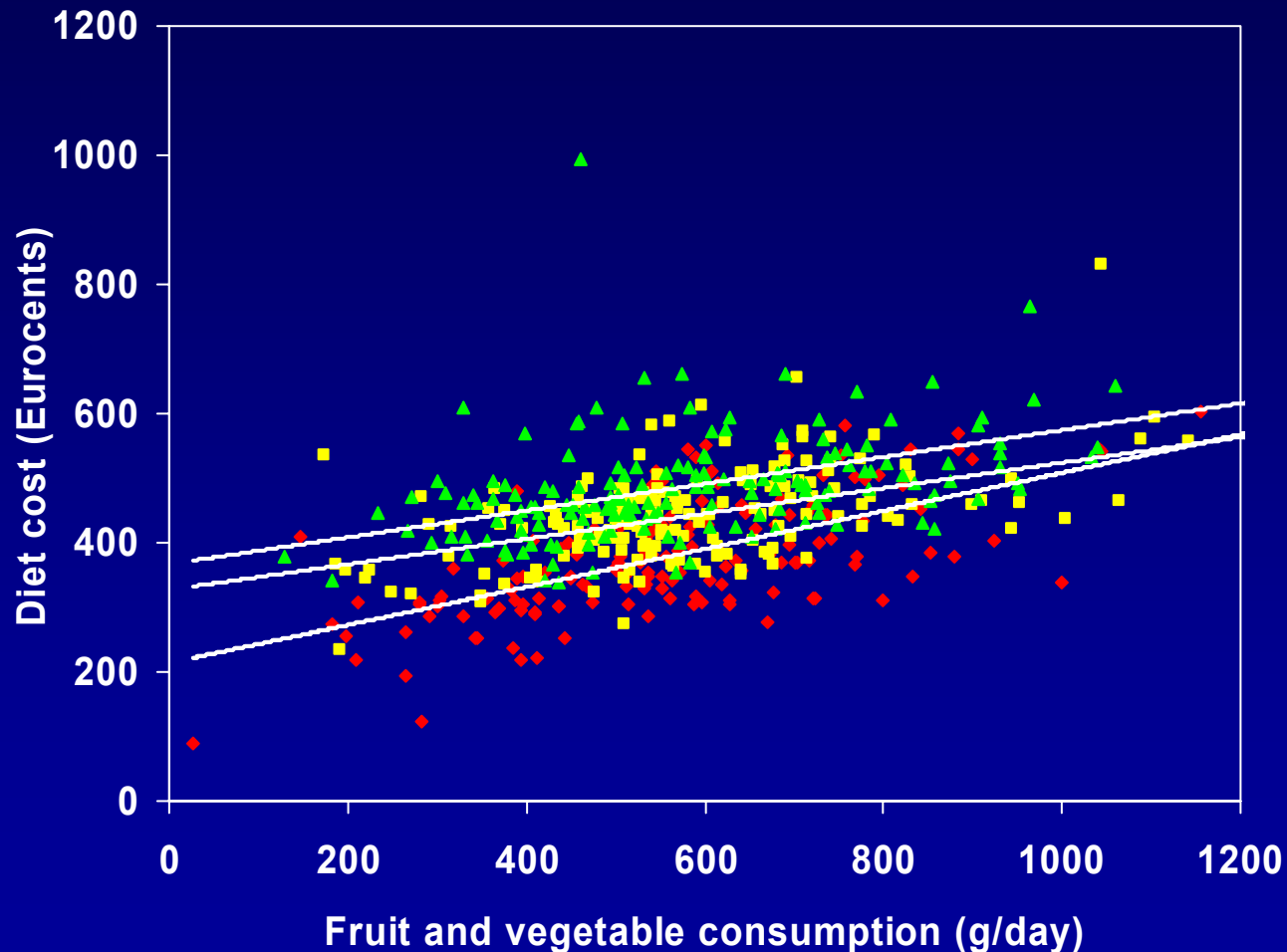
At each level of energy intake, eating more vegetables and fruit was associated with higher diet costs



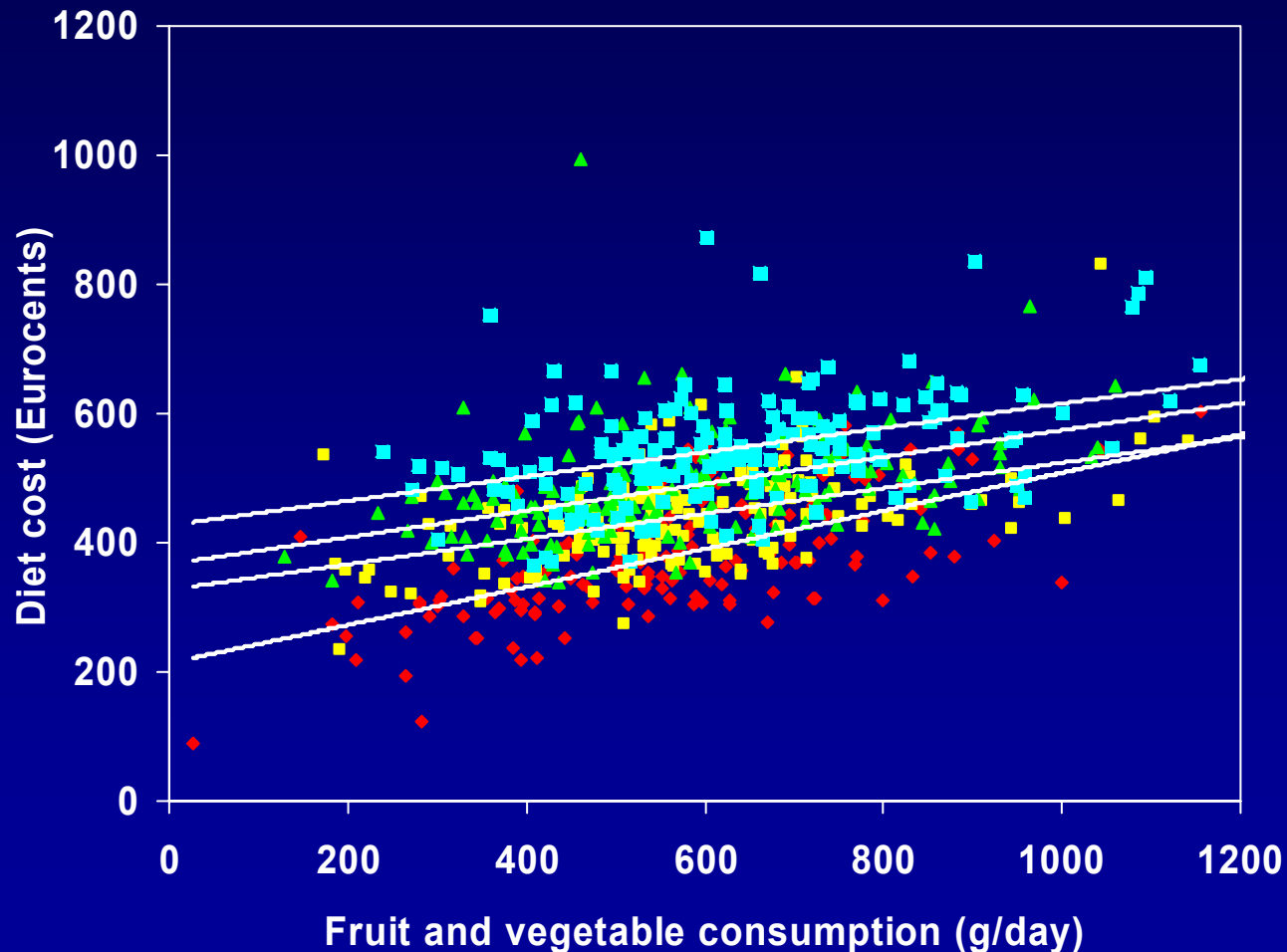
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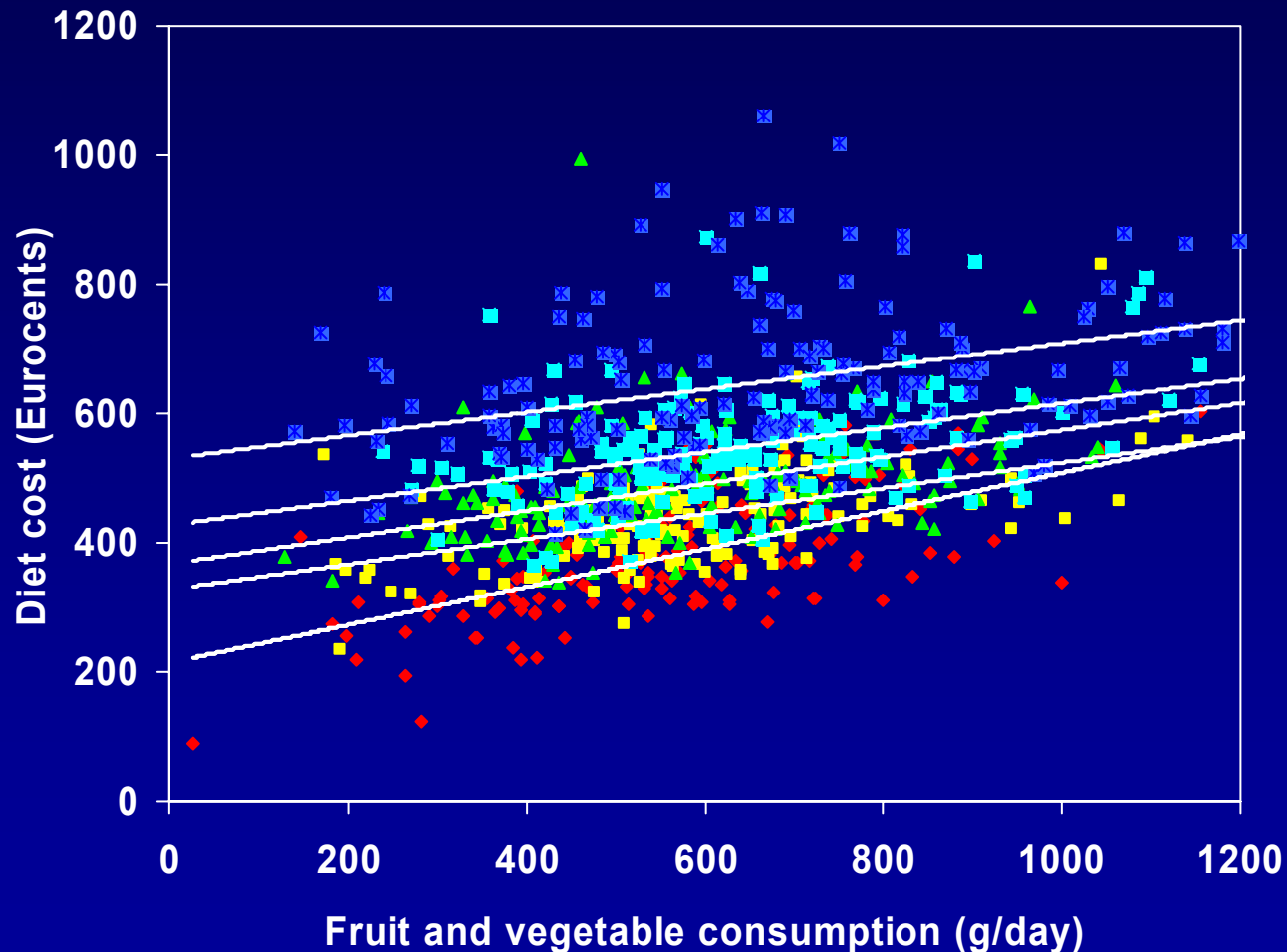
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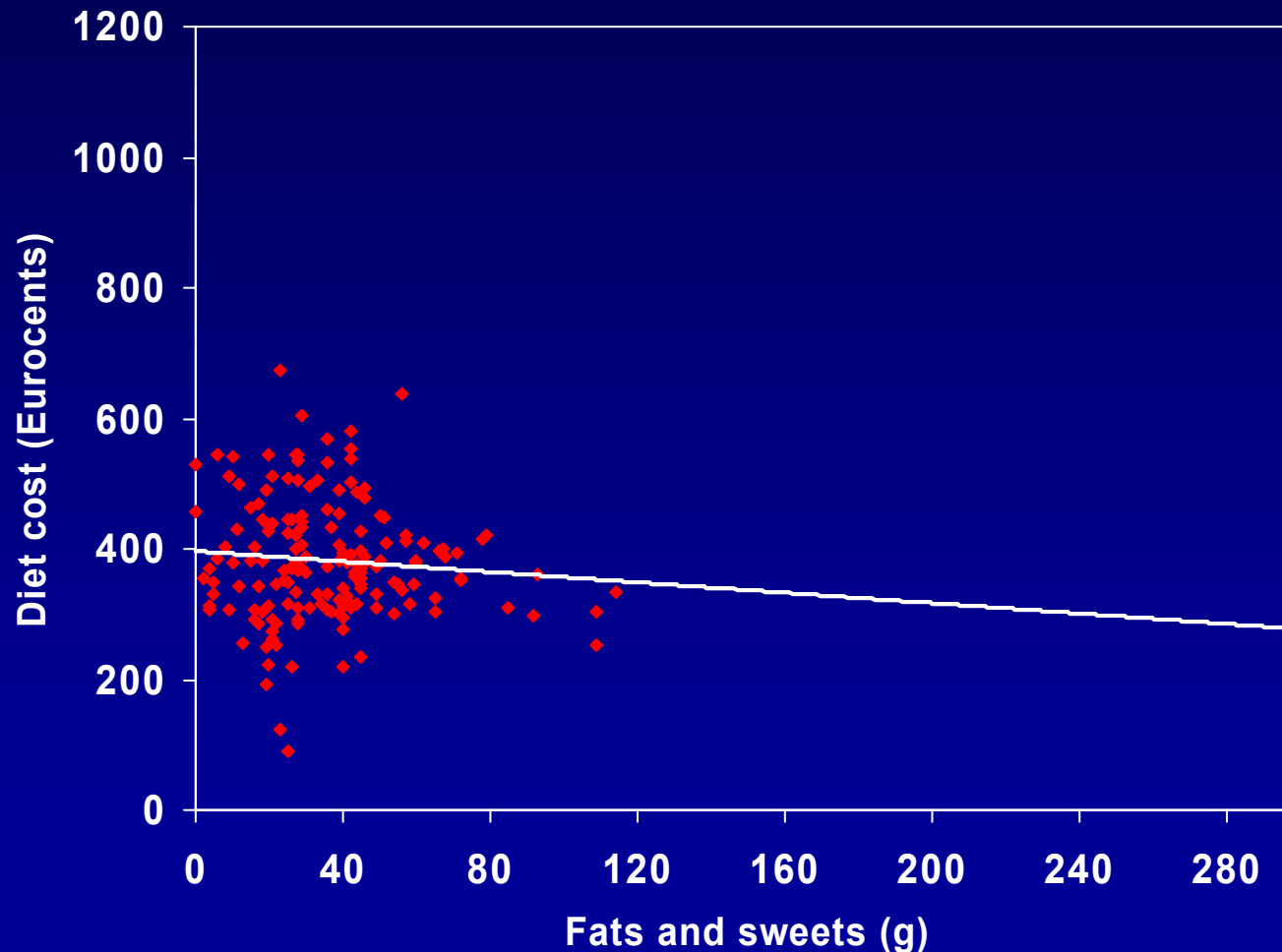
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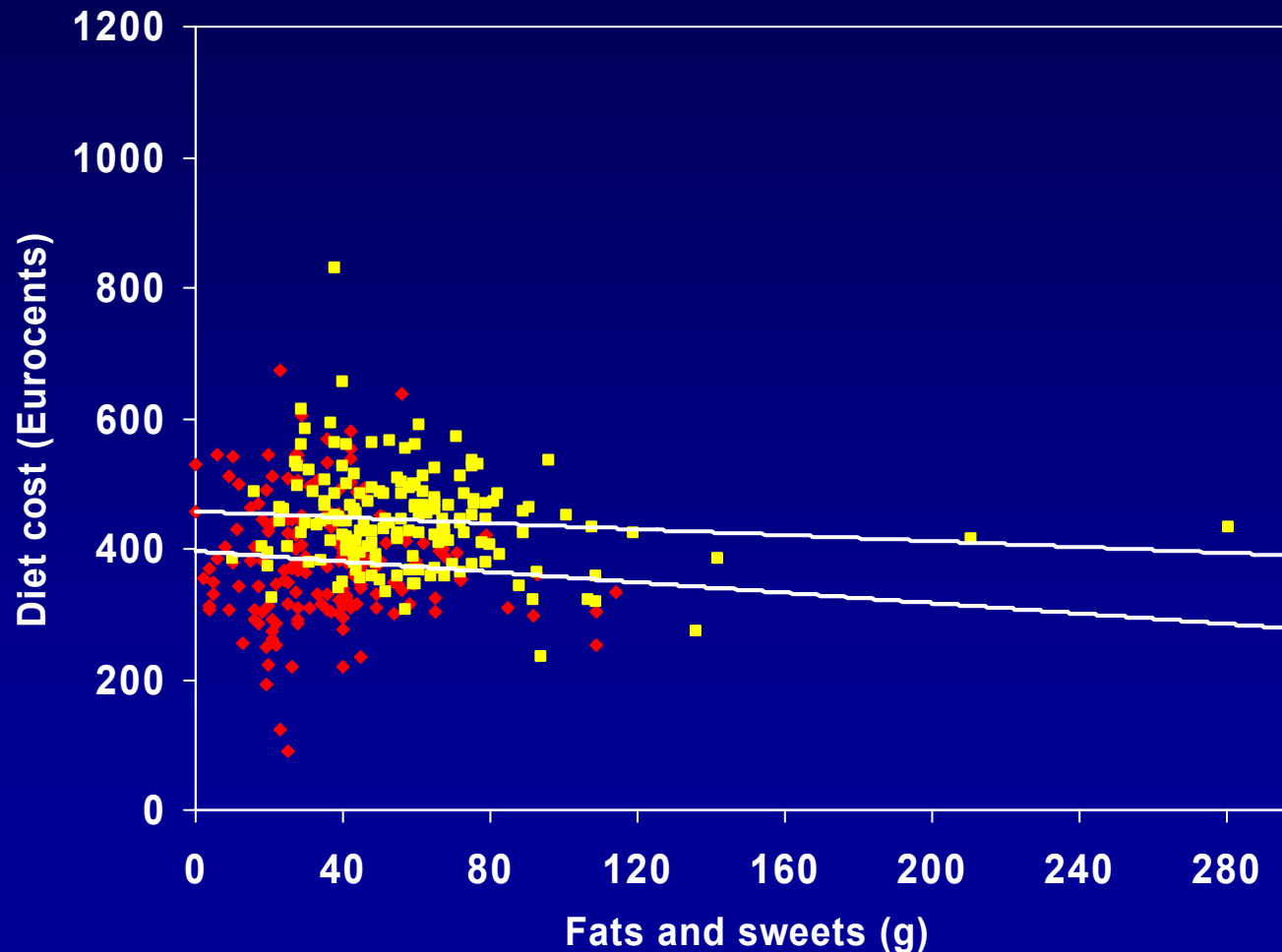
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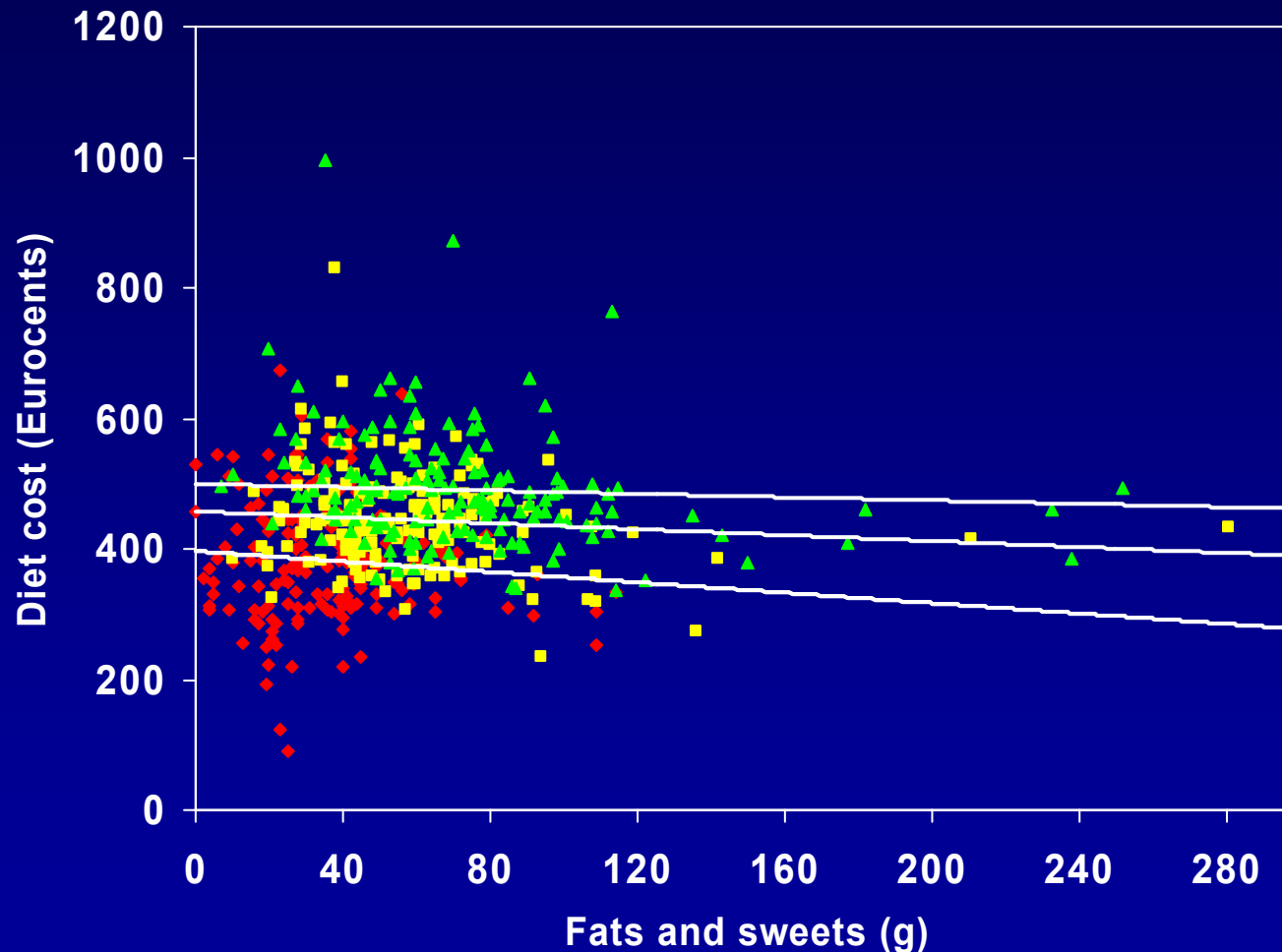
At each level of energy intake, eating more fats and sweets was associated with lower diet costs



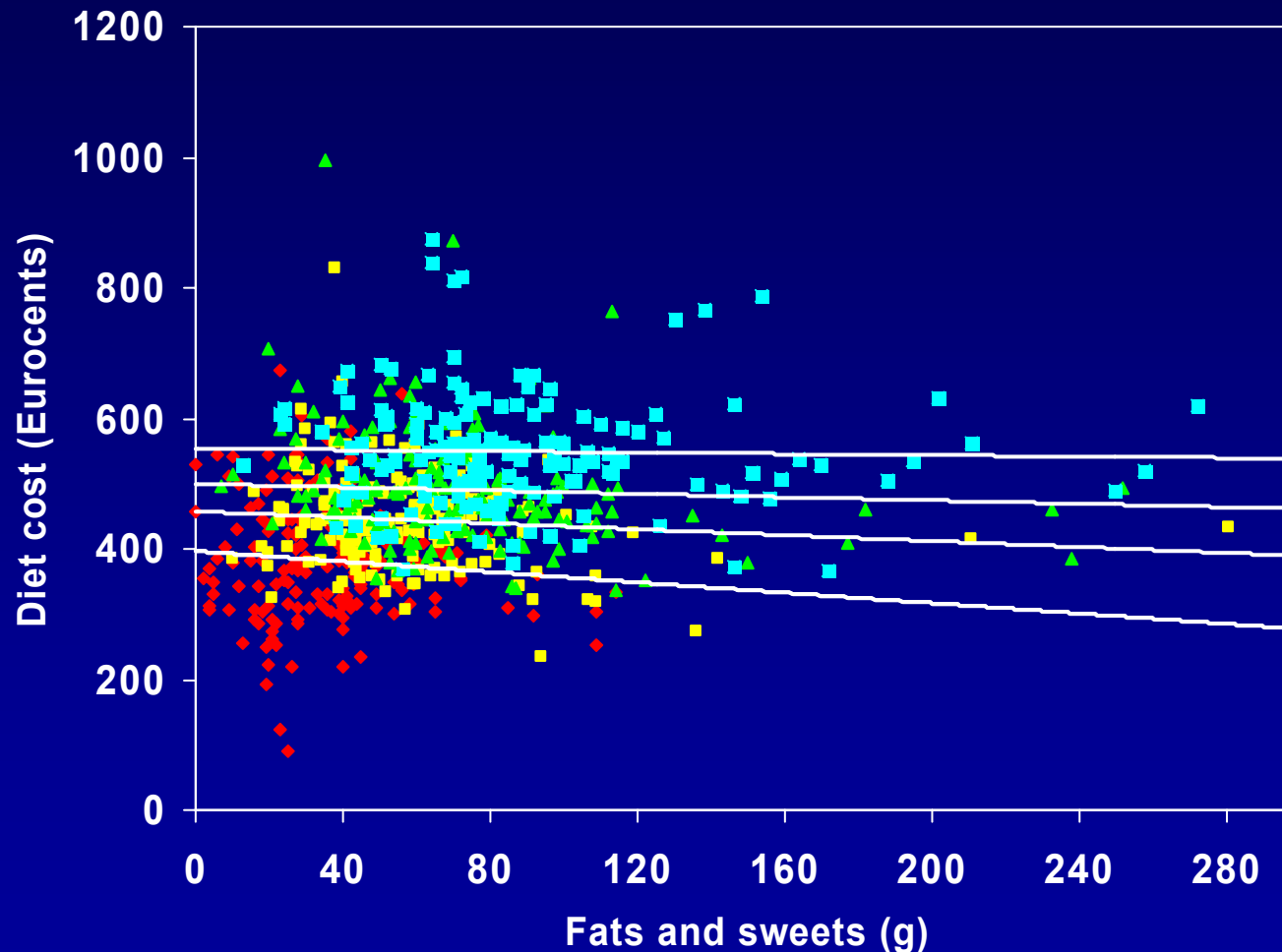
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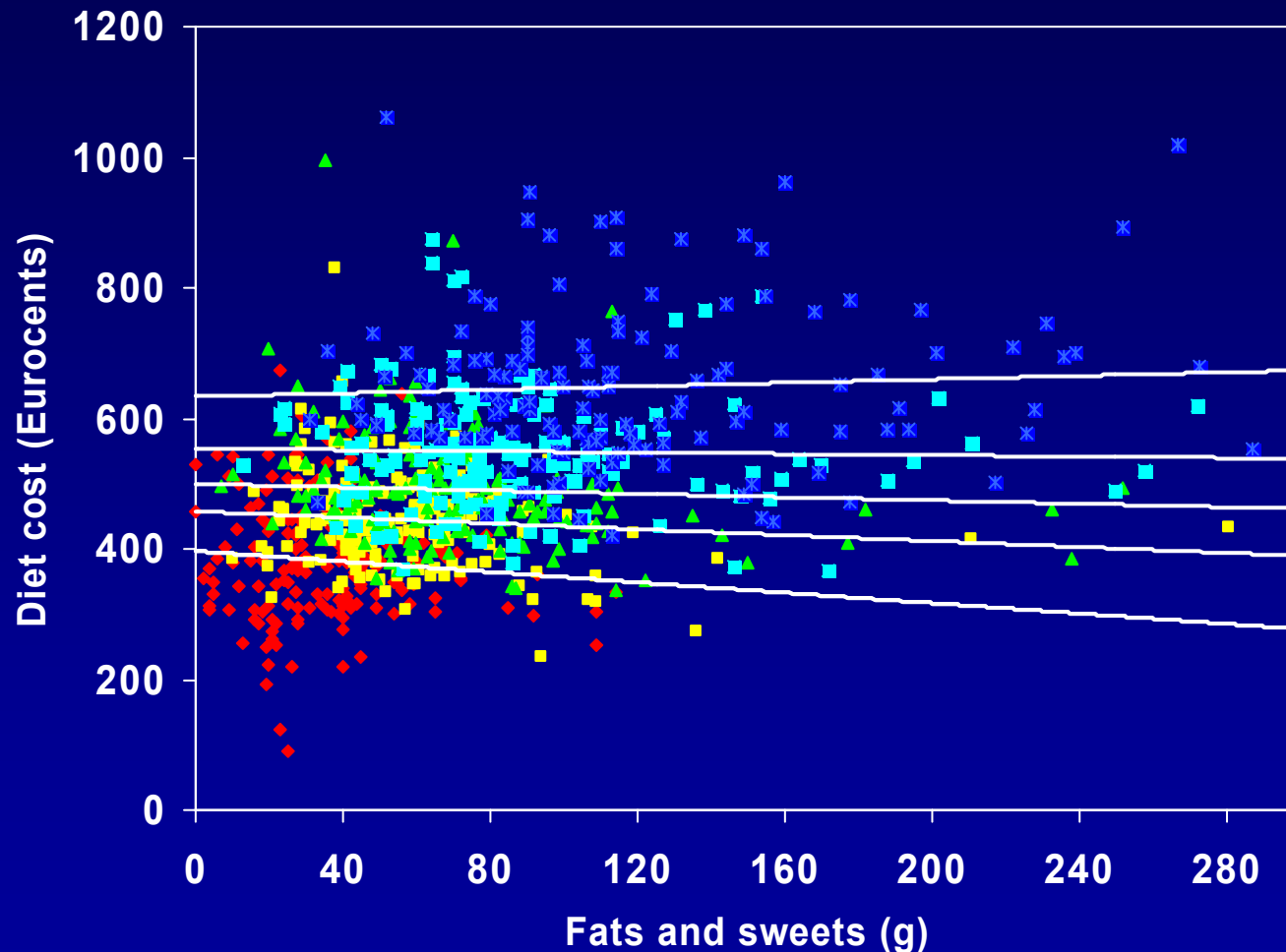
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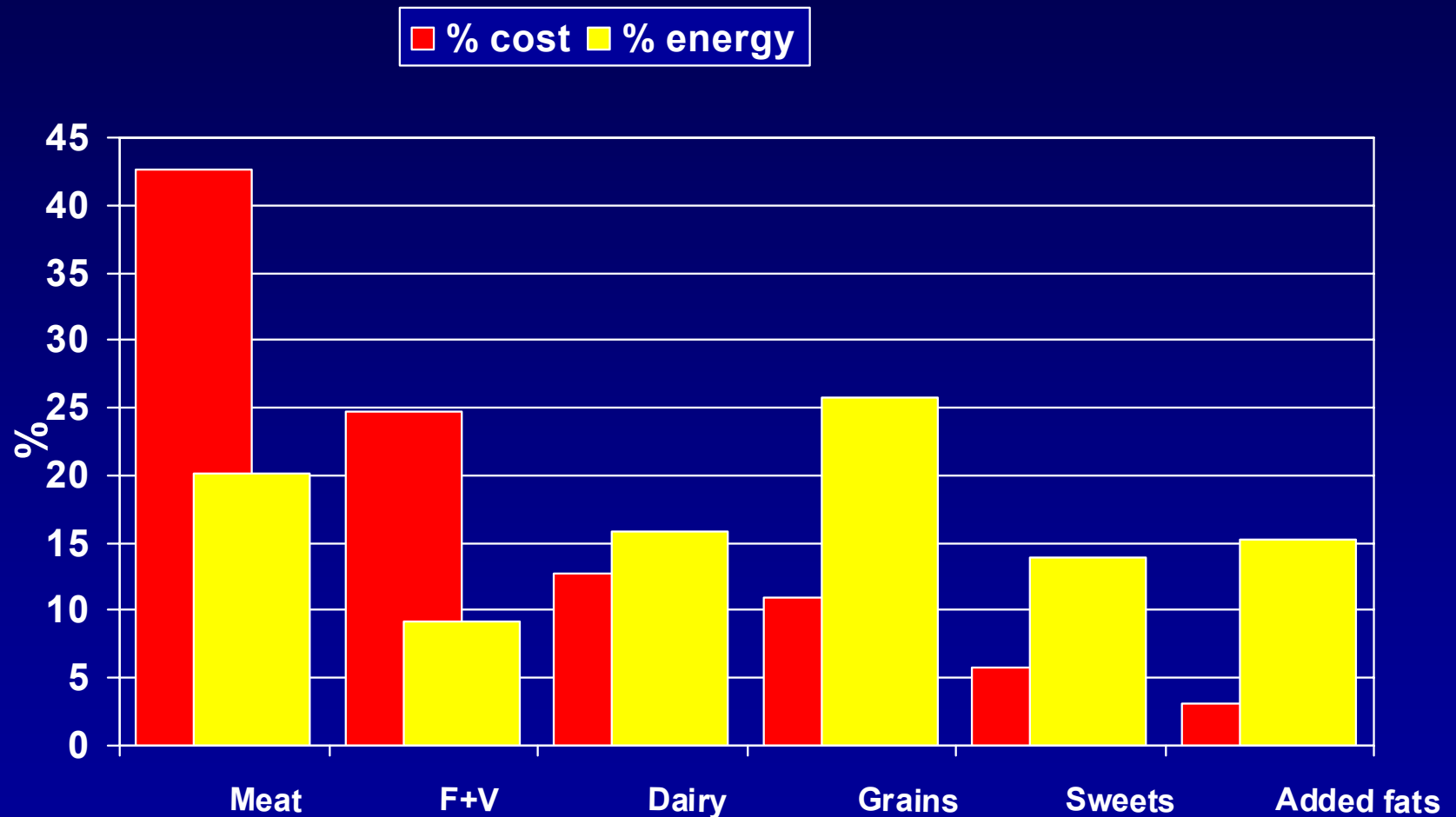
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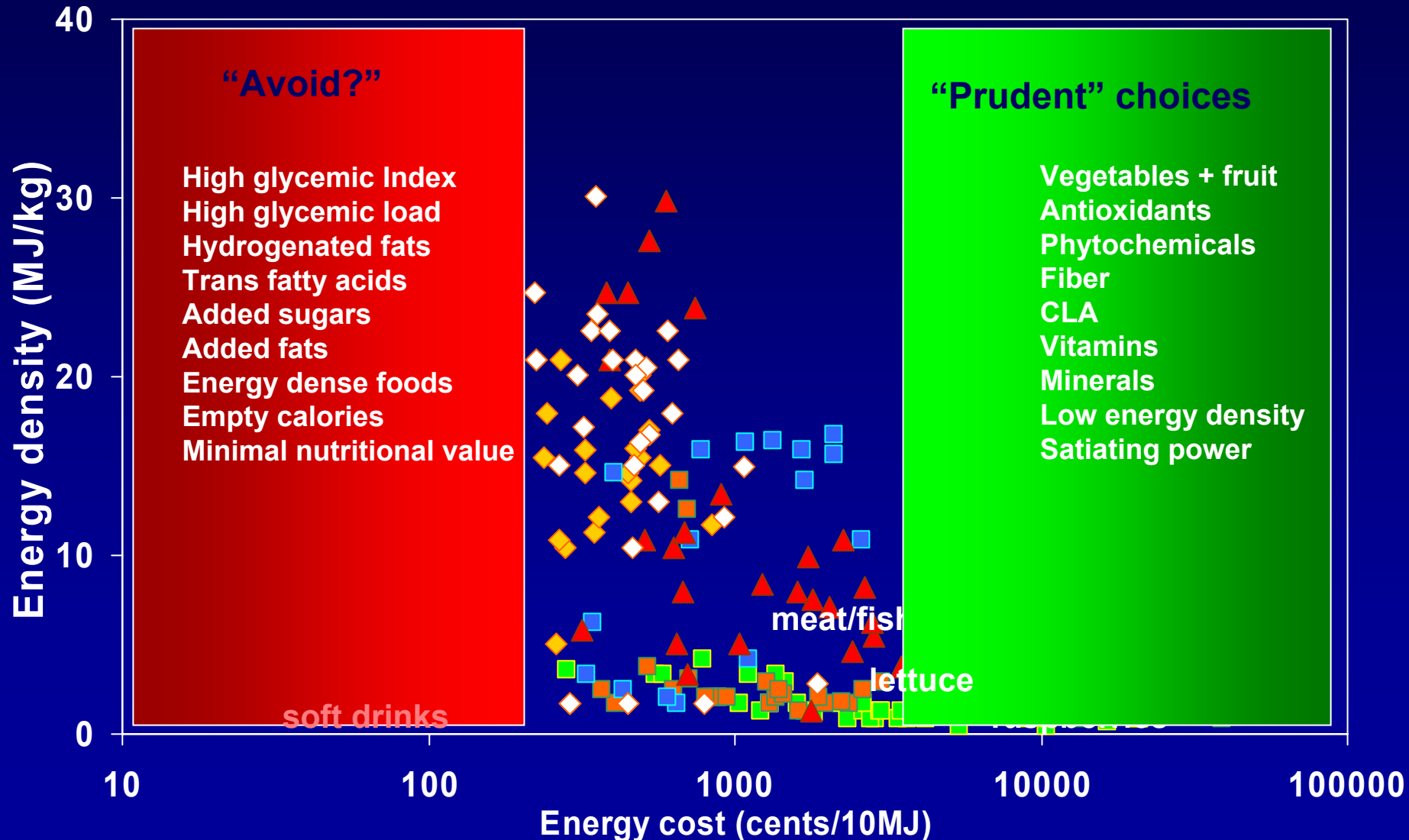
Percent dietary energy and percent diet cost contributed by each food group



We talk about nutrition – but never about cost

Are “healthful” foods simply more expensive?

◆ Grains ■ Vegetables ■ Fruit ■ Milk ▲ Meat ◆ Fats/sweets

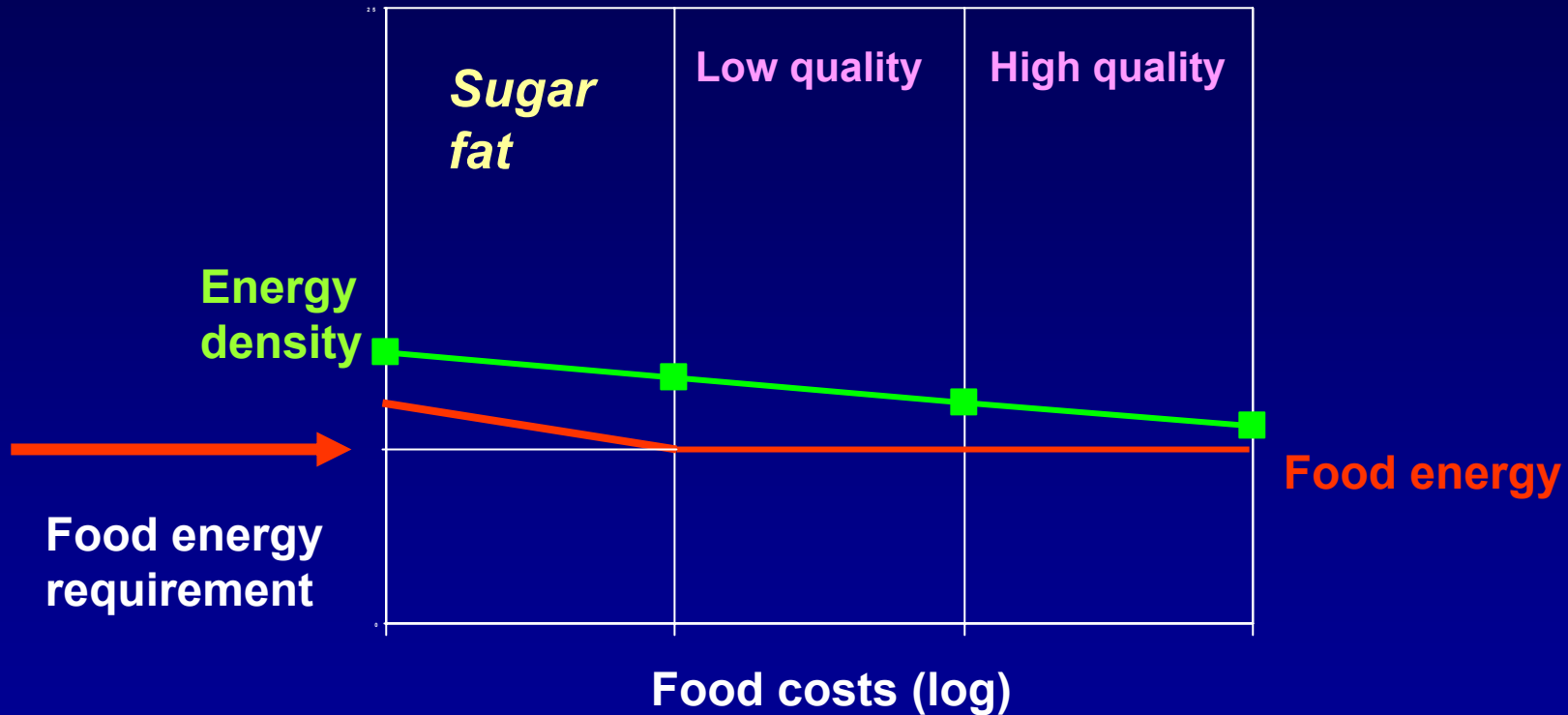


**What can you get for \$25 per
person per week?**

**The USDA Thrifty Food Plan is
considered a low-cost “healthy”
diet**

The Energy Density curve

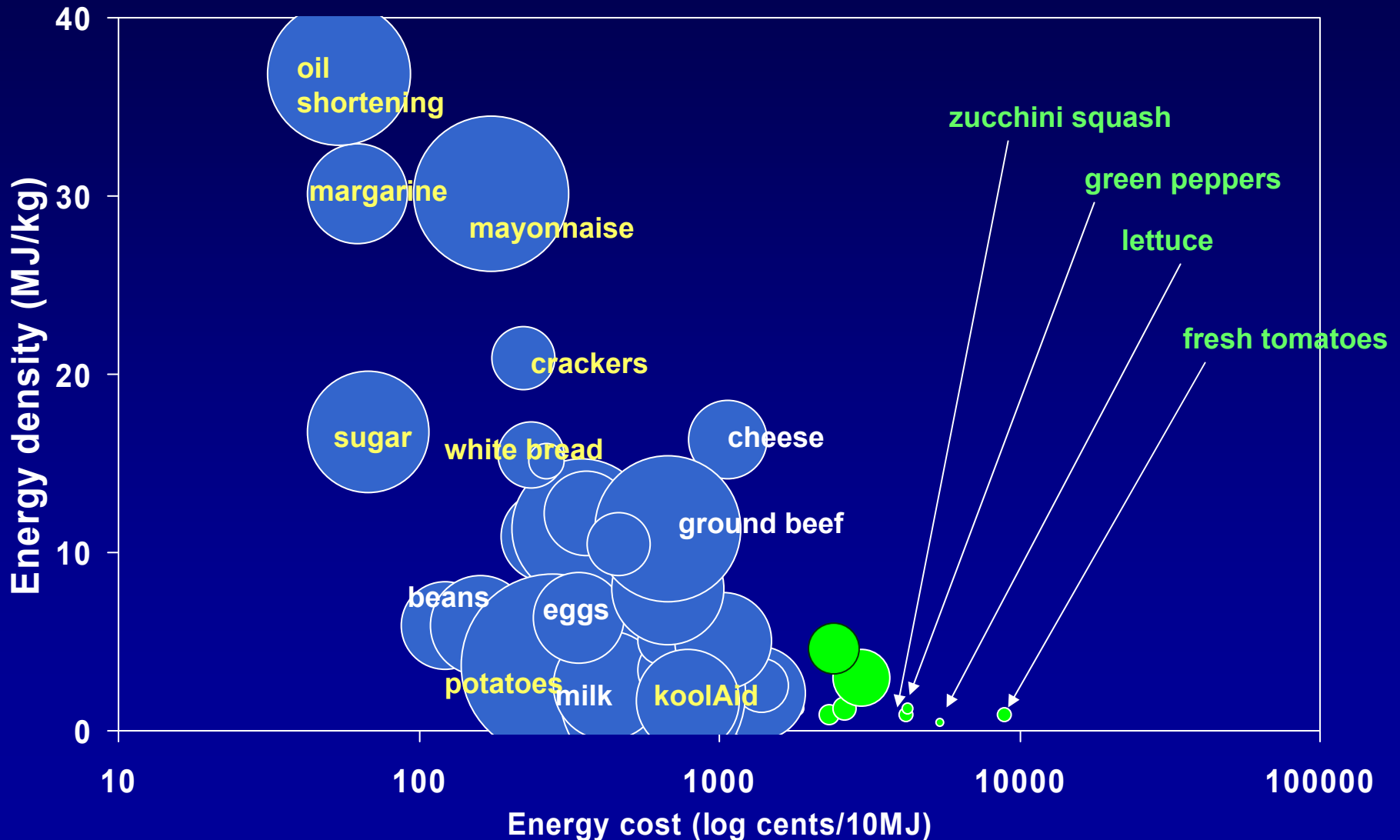
Drewnowski and Specter AJCN 2004:79:6-16



The paradox – saving on food costs will lead to more energy dense diets – with greater potential for overeating

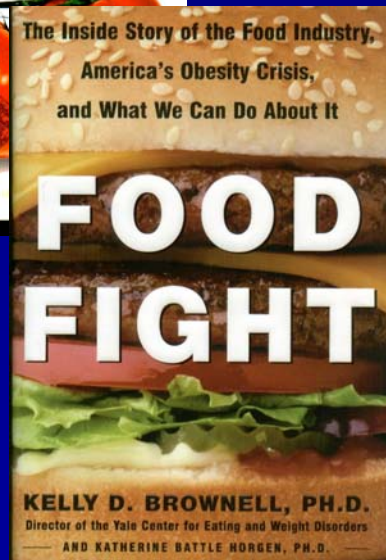
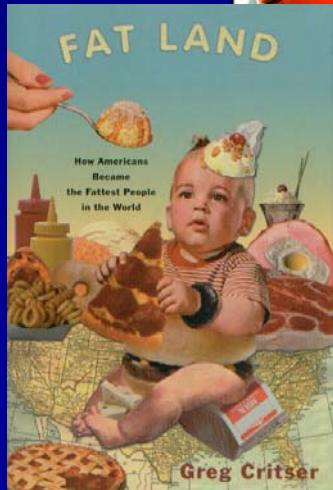
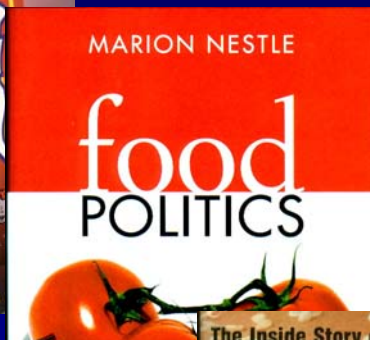
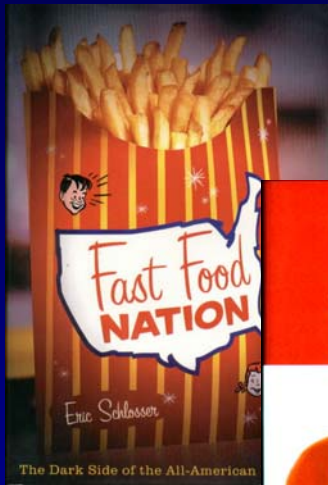
The cheapest calories: grains, sugar and fat

Thrifty Food Plan 1999 (size of bubble – calories/week)



Obesity has become our Nation's fastest-rising public health threat

Senate Appropriations Committee Report 2002



- Are we tricked into over-consuming starches, corn sweeteners, and fats?
- Is fast food the “tobacco of the 21st century”?
- Should we restrict access to unhealthy foods?
- Or is there a simple explanation?

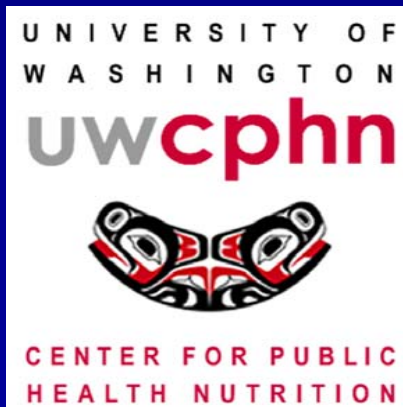
Is the link between SES and obesity mediated by access to healthy diets?



- Some families spend as little as \$25 per person per week on food
- Low-cost foods are energy-dense, palatable, and (potentially) less satiating
- Other social and behavioral factors (convenience, cooking skills, time) also play a part
- Access to healthy foods also means physical access – we need more studies of the food environment

Obesity: low metabolism or low wages?

- Obesity in the US is an economic phenomenon – many people are obese *because they are poor*
- Obesity has everything to do with the environment:
 - built environment
 - social environment
 - economic environment
- The obesity problem cannot be resolved using purely medical approaches – we need broader-based strategies for prevention



For more see: www.cphn.org